

9.0 LOWER BURNING GROUND

9.1 Declaration

The following section provides the declaration portion of the ROD/RAP for the Lower Burning Ground.

9.1.1 Location

The Lower Burning Ground is located near the northeast corner of the Main Depot, as shown in Figure 1.1. The Lower Burning Ground was used for burning munitions and various pyrotechnics in pits and on the ground surface from approximately 1946 to 1974. The site encompasses a relatively large, irregularly shaped area that measures approximately 5,300 feet by 1,800 feet. The site includes a rectangular-shaped portion identified as Interim Burning Area A (Figure 9.1). Interim Burning Area A was used in 1960 and 1961, while the primary burning ground was being renovated, and may have been used as late as 1974 (USATHAMA, 1979).

9.1.2 Assessment of the Site

A contamination assessment of the Lower Burning Ground was conducted during the Group III RI. The results of that assessment, presented in the Group III B Sites Final RI Report (HLA, 1994b), are summarized as follows:

- Geophysical survey results indicated substantial amounts of buried metal.
- Unexploded ordnance (UXO) surveys indicated the presence of UXO across the site.
- Soil-gas survey results did not indicate potential sources of organic contamination at the site.
- Metal concentrations in surface-soil samples detected above background concentrations included aluminum, arsenic, cadmium, chromium, copper, lead, mercury, silver, sodium, thallium, and zinc. Heptachlor epoxide and 1,3,5-trinitrobenzene were detected in 1 of 10 surface-soil samples.
- Analytical results from groundwater sampling indicated very low-level detections of isodrin that are considered questionable.

A potential unacceptable risk to human health from the detected concentrations of arsenic and chromium in surface soil was identified in a residential exposure scenario during the baseline risk assessment. Arsenic concentrations at the Lower Burning Ground are below background levels and chromium concentrations are below preliminary remediation goals (PRGs). However, the presence of UXO at the site poses greater immediate health risks than metals in the soil. Access to this site is

currently restricted to SIAD personnel, and fencing and warning signs are present to indicate the presence and danger of UXO. The presence of UXO resulting in site restrictions minimizes potential human exposure routes. Deed and further access restrictions will be placed on the Lower Burning Ground thus preventing the future establishment of residential development. Although these restrictions are not part of the CERCLA process, the restrictions will provide protection to human health from contaminants at the site by limiting onsite access. Therefore, no action is recommended at this site.

9.1.3 Description of the Selected Remedy

As discussed in the preceding section, no action is recommended for this site. Because UXO is present at the Lower Burning Ground, deed and access restrictions will be placed on the site. Access is already restricted and warning signs and fencing are in place to prevent exposure to UXO.

9.1.4 Statutory Determinations

Because no remedial actions are required at this site, no statutory determinations of remedial actions are necessary.

9.2 Decision Summary

This section provides an overview of the site-specific factors and analyses that were considered in the selection of the response action for the Lower Burning Ground.

9.2.1 Site Description

The Lower Burning Ground is generally free of vegetation. A greasewood and sagebrush brush line marks the eastern site boundary, and a gravel road marks the western site boundary. The terrain is flat, with the exception of several open pits and associated soil mounds in the northern area, and a relatively large elongated pit (200 feet long by 35 feet wide by 10 feet deep) in the central area.

Alignments of shallow trenches approximately 1 to 2 feet deep were observed in the central area, and long paired alignments of gravel were observed in the northern area and in Interim Burning Area A during the RI field activities in 1992. Small metal debris, including spent ordnance casings, nails, bolts, straps, and hinges are scattered throughout the site. Metal signs noting "Flashed Scrap Metal Buried Here" are located in the western-central area.

9.2.2 Site History and Enforcement Activities

From 1946 to 1974, the Lower Burning Ground used for burning munitions and various pyrotechnics in pits and on the ground surface. Interim Burning Area A was used in 1960 and 1961, while the primary burning ground was being renovated, and may have been used as late as 1974 (USATHAMA, 1979).

A variety of materials have reportedly been disposed at the Lower Burning Ground. These materials include explosives; waste products generated during demilitarization operations including primers, charges, waste rags, paint sludge, and solvents; powder projectiles; and other munitions. In general, dumping was uncontrolled at the Lower Burning Ground; materials burned at Interim Burning Area A included projectiles containing TNT and composition B, a combination of TNT and cyclometri-methylenetrinitramine (RDX); trash contaminated by explosives; and fuses containing lead compounds.

Much of the burning and dumping at the Lower Burning Ground was reportedly performed in pits. Metal debris and scraps were removed periodically from the pits and sent to the Defense Property Disposal Office (DPDO) for disposal. The DPDO area is currently identified as the Defense Reutilization and Marketing Office (DRMO) trench area and is being investigated by Montgomery Watson as part of the SIAD Group I sites RI/FS. After removal of salvageable material, most of the pits were backfilled and covered (ESE, 1983).

Investigations that have been conducted at the Lower Burning Ground include the following:

- Soil contamination investigation at open-burning/open-detonation grounds, U.S. Army Environmental Hygiene Agency (USAEHA), 1985a
- Groundwater consultation, USAEHA, 1987
- Group III Remedial Investigation, HLA, 1994b
- Remedial Investigation follow-up groundwater sampling, HLA, 1994b
- Feasibility Study, HLA, 1995

In October 1984, USAEHA drilled and sampled five soil borings adjacent to a relatively large disposal trench in the central portion of the site. At the same time, five surface-soil samples were collected from the bottom of the trench. Each subsurface-soil sample was analyzed for metals and explosives, and two samples were analyzed for SVOCs. The explosives TNT and RDX were detected in one sample at very low concentrations. No SVOCs were detected. Metals detected in subsurface-soil samples included arsenic, barium, cadmium, chromium, lead, and mercury. Each surface-soil sample was analyzed for metals and explosives, and one sample was also analyzed for SVOCs and pesticides. No explosives, SVOCs, or pesticides were detected in surface-soil samples. Metals detected in surface-soil samples included barium, cadmium, chromium, copper, and lead.

USAEHA installed two monitoring wells, LBG-1-MW and LBG-2-MW, in August 1984 at locations upgradient (northeast) and downgradient (west) of the site. The wells were sampled in 1985, 1986, and 1987. Groundwater samples collected in August 1985 were analyzed for metals, purgeable organic compounds, and SVOCs. Groundwater samples collected in November 1986 and June 1987 were analyzed for metals, purgeable organic compounds, SVOCs, and explosives. Except for several sporadic, low-level detections of the common laboratory contaminants toluene and methylene chloride, no purgeable organic compounds, SVOCs, or explosives were detected. Metals detected in groundwater samples include arsenic, barium, boron, calcium, copper, magnesium, manganese, potassium, selenium, sodium, and zinc.

The purpose of the Group III RI conducted by HLA was to ensure that potential environmental impacts associated with past and present waste management activities at the site were thoroughly investigated and, if necessary, remediated. The investigation included a surface geophysics survey, soil-gas survey, an UXO survey, surface-soil sampling, drilling and sampling soil borings, and monitoring well installation and groundwater sampling. The surface geophysics survey indicated the presence of substantial amounts of buried metal and the results of the UXO survey indicated the presence of UXO across the site.

The follow-up groundwater sampling conducted by HLA was performed at the request of DTSC. The additional round of groundwater sampling confirmed that Army activities at the site had not

adversely impacted groundwater quality. A letter report with an analysis of the results of the follow-up sampling is included in Appendix U of the Group III B Sites RI Report (HLA, 1994b).

A FS report for two Group III B sites was prepared by HLA (1996). Soil was the medium of concern identified and addressed in the FS.

No enforcement activity has been associated with the Lower Burning Ground. The site is subject to the requirements and schedules outlined in the FFA.

9.2.3 Highlights of Community Participation

One 30-day public comment period was held from February 7, 1996, to March 7, 1996. A public meeting was held at SIAD on February 22, 1996. Representatives of the Army, DTSC, and the Lahontan RWQCB were present at the meeting. Responses to site-specific questions raised by the public at this meeting are presented in Section 9.3 of this ROD/RAP.

The public participation requirements of CERCLA § 113(k)(2)(B)(i-v) and § 117 and § 25356.1 of the California Health and Safety Code were met in the remedy selection for this site. The response action presented for this site in this ROD/RAP was selected in accordance with CERCLA, NCP, Chapter 6.8 of the California Health and Safety Code, and the California Water Code. The basis for this decision is documented in the Administrative Record.

9.2.4 Scope and Role of Response Action

This ROD/RAP presents the final response action for the Lower Burning Ground. Although no further action is the recommended response action, deed and access restrictions will be placed on the site due to the presence of UXO.

9.2.5 Site Characteristics

Contamination at the Lower Burning Ground was suspected on the basis of past activities at this site that included burning munitions and various pyrotechnics in pits and on the ground surface and the reported dumping of waste products generated during demilitarization operations. Potential contamination at the Lower Burning Ground was evaluated on the basis of surface geophysical data,

soil-gas data, surface- and subsurface-soil analytical data, and groundwater analytical data. An assessment of potential contamination at the site based on these data is provided in the following subsections.

9.2.5.1 USAEHA Investigations

Environmental investigations were performed by the USAEHA at the Lower Burning Ground from 1984 through 1987. These investigations included soil sampling in five borings, collecting five surface-soil samples, and installation and groundwater sampling from two monitoring wells. The results of these investigations were reported in USAEHA Report No. 37-26-0529-85 (1985a), USAEHA 1986 Report No. 38-26-503-86, and No. 38-26-0822-87 (1987). A summary of the results is also presented in Benioff et al. (1988) and the Final Group III B Sites RI Report (HLA, 1994b).

9.2.5.2 Group III Remedial Investigations

HLA performed remedial investigations at the lower Burning Ground under the Army's IRP. The IRP work conducted included the studies described below.

Surface Geophysics

Data assessed from the geophysical survey indicate three main areas of anomalous geophysical response characteristic of substantial amounts of buried metal (See Appendix B to HLA, 1994b; Figure B7). Six potential disposal cells were identified in the western area of the site (See Appendix B to HLA 1994b, Figure B8). In the southern portion of the Lower Burning Ground (Interim Area A), three separate anomalies spaced approximately 200 feet apart were identified. Two of these anomalies correspond to observed areas where the ground has cracked and subsided, suggesting the presence of backfilled trenches. The third main area of anomalous geophysical response corresponds with an approximately 100-foot by 100-foot notch in the brushline along the east edge of the site. This area is characterized by reworked surface soil and scattered surficial metal debris.

Soil Gas

Ninety-five soil-gas samples were collected across the Lower Burning Ground and analyzed for selected VOCs and total volatile hydrocarbons (TVHs). Due to the presence of UXO at the site, soil-gas samples were obtained from a depth of 2 feet bgs. A summary of the soil-gas analytical results is presented in Table 9.1. As indicated in this table, only two VOCs (TCA and TCE) and TVH were

detected during the soil-gas survey performed at the Lower Burning Ground. The maximum soil-gas concentrations of TCA, TCE, and TVH were 0.003, 0.1, and 14 $\mu\text{g/l}$, respectively.

There are no laterally continuous patterns in the detections and concentrations of soil-gas analytes at the respective Lower Burning Ground soil-gas sample collection locations. Therefore, the detections and concentrations do not indicate significant subsurface soil or groundwater sources of volatile organic contamination. This assessment was supported by the analytical results of the Lower Burning Ground surface-soil and groundwater samples, as discussed below.

Surface Soil

Surface-soil contamination at the Lower Burning Ground was assessed on the basis of samples collected from the surface to 0.5-foot interval of 10 composite soil samples (Figure 9.1). Sample locations were selected in areas of highest potential impact from past site activities. Surface-soil samples were analyzed for TAL metals, explosives, TCL SVOCs, and pesticides/PCBs. Sample LBG-1-SS was also analyzed for TPH and dioxins/furans.

Table 9.2 summarizes the analytical results for metals detected in the surface-soil samples at concentrations greater than background concentrations for the soil types 325 (Epot very fine sandy loam) and 330 (Calneva silt loam). The following 16 analytes were detected at concentrations above the soil type-specific background concentration (excluding cyanide): aluminum, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, potassium, silver, thallium, vanadium, and zinc. These metals were detected at concentrations greater than soil type-specific and facilitywide maximum background concentrations and may be potentially associated with site activities. Barium, chromium, cobalt, iron, manganese, mercury, nickel, silver, vanadium, and zinc were detected at concentrations at the Lower Burning Ground below their maximum background detections of 1,499; 150; 30; 100,000; 2,000; 29.00; 50; 20; 700, and 150 mg/kg, respectively, found in the Skedaddle Mountains Wilderness Area. Cadmium, copper, lead, mercury, thallium, and zinc were detected at levels significantly above soil type-specific, facilitywide, and regional background concentrations. Figure 9.2 presents the values and locations of these inorganic analytes detected in surface-soil samples.

Samples LBG-1-SS, LBG-3-SS, LBG-7-SS, and LBG-8-SS contained the highest or highly elevated concentrations of cadmium, copper, lead, and zinc. The highest detected concentrations of cadmium, copper, lead, and zinc reported during this investigation at the Lower Burning Ground were 11.8, 1,500, 4,500, and 11,000 mg/kg. The maximum concentration of silver (3.66 mg/kg) was detected in LBG-3-SS. Sample LBG-8-SS contained maximum or near maximum concentrations of mercury, which was detected at 0.164 mg/kg, compared to the soil type-specific maximum background concentration of 0.05 mg/kg. Thallium and zinc were detected in LBG-2-SS at 143 and 161 mg/kg, respectively.

Samples LBG-4-SS and LBG-5-SS were both sampled in the northern portion of the Lower Burning Ground. Thallium was detected at 120 and 131 mg/kg, respectively. These concentrations are above the soil type-specific background concentration of 62.9 mg/kg. LBG-5-SS also contained cyanide at a concentration of 0.78 mg/kg, which is above the CRL of 0.25 mg/kg for cyanide. Cyanide was also detected in LBG-6-SS at a concentration of 0.26 mg/kg, which was only slightly above the CRL for cyanide. Sample LBG-6-SS was located approximately 400 feet southeast of LBG-5-SS. Background SIAD surface-soil concentrations for cyanide are not available for comparison to investigative samples. Because cyanide may be produced naturally via nitrate metabolism by microorganisms and because these detected values of cyanide are low and only slightly above their CRLs, the detected cyanide may be associated with the natural soil conditions at the Lower Burning Ground. However, cyanide could also be a by-product in the combustion of polymers.

In addition to cyanide, LBG-6-SS also contained cadmium and lead at concentrations of 3.65 and 24 mg/kg, respectively. Lead was also detected at concentrations of 14.2 and 19.5 mg/kg in soil Samples LBG-9-SS and LBG-10-SS, respectively. These samples were collected in Interim Burning Area A at the southern portion of the Lower Burning Ground. Because cadmium and lead were detected at significantly higher concentrations than background concentrations and in other samples collected from the Lower Burning Ground, it appears that the detected concentrations of lead in LBG-6-SS, LBG-9-SS, and LBG-10-SS and cadmium in LBG-6-SS are likely the result of site activities.

PCBs, TPH, and dioxin/furans were not detected in the surface-soil samples at concentrations above the CRL. The compound 1,3,5-trinitrobenzene was the only explosive detected in the surface-soil samples. This compound was detected in surface-soil sample LBG-5-SS at a concentration of 5.81 mg/kg. The only pesticide detected in the surface-soil samples from the Lower Burning Ground was heptachlor epoxide. This pesticide was detected in one surface-soil sample (LBG-5-SS) at a concentration of 0.00252 mg/kg, which is less than two times the CRL of 0.0013 mg/kg. The only TCL SVOC detected in the surface-soil samples at the site was di-N-butyl phthalate. This compound was detected in one surface-soil sample (LBG-7-SS) at a concentration of 1.4 mg/kg, which is only slightly above the CRL of 1.3 mg/kg. Figure 9.3 presents the locations and values of 1,3,5-trinitrobenzene, heptachlor epoxide, and di-N-butyl phthalate detected in the surface-soil samples.

Groundwater

Potential contamination of groundwater at the Lower Burning Ground was assessed on the basis of groundwater collected from four monitoring wells (LBG-3-MW through LBG-6-MW) during two rounds of sampling (Figure 9.1). One groundwater sampling round was performed on September 17, 1992, and the other sampling round was performed December 8 through 9, 1992. Samples were analyzed for TCL organics, TAL metals, explosives, and macroparameters. A supplemental groundwater assessment was performed with a third round of sampling conducted at the request of DTSC. The third round of groundwater sampling was performed from May 31 through June 2, 1994. Samples were analyzed for TCL organics, TAL metals, explosives, and macroparameters.

Table 9.3 provides a summary of analytical results for organic analytes detected in groundwater samples. Table 9.3 also provides a summary of the analytical results for inorganic analytes detected in groundwater samples at concentrations greater than Lower Burning Ground background groundwater concentrations and summaries of the analyte concentrations representative of site and facility-wide background groundwater. Available federal and California (state) MCLs, as well as the CRLs for the analytical results, are included in Table 9.3.

Round 1 and 2. Acetone and methyl ethyl ketone (2-butanone) were the only two TCL organic volatile analytes detected above the CRLs. Acetone was detected in groundwater samples from

Well LBG-4-MW and methyl ethyl ketone was detected in samples from Wells LBG-3-MW and LBG-4-MW. Acetone was only detected in the groundwater sample collected from LBG-4-MW during the second round of groundwater sampling (December 9, 1992). The acetone concentration in this groundwater sample was 20 $\mu\text{g/l}$, slightly higher than the CRL of 8.0 $\mu\text{g/kg}$ for acetone. Based on the following observations, the acetone detected in LBG-4-MW is likely not associated with site conditions because:

- Acetone was only detected in one of two sampling rounds.
- The concentration detected was near the CRL value.
- Acetone is a common laboratory contaminant.

Methyl ethyl ketone was detected in the groundwater samples collected from LBG-4-MW during the first (September 17, 1992) and the second (December 9, 1992) groundwater sampling rounds. The Methyl ethyl ketone concentrations in these samples were 159 and 71 $\mu\text{g/l}$, approximately 16 and 7 times the CRL concentration, respectively. Methyl ethyl ketone is a common laboratory contaminant and is likely associated with the laboratory. However, because methyl ethyl ketone was detected in both sampling rounds at concentrations significantly higher than the CRL concentration of 10.0 $\mu\text{g/l}$, the methyl ethyl ketone detected at LBG-4-MW may represent site conditions. Methyl ethyl ketone was also detected at a concentration of 64 $\mu\text{g/l}$ in the duplicate sample collected from LBG-3-MW during the first groundwater sampling round. However, the corresponding investigative sample did not contain methyl ethyl ketone above the CRL. Methyl ethyl ketone was not detected in LBG-3-MW above the CRL concentration during the second round of groundwater sampling (December 8, 1992). The methyl ethyl ketone value detected in the duplicate sample for Well LBG-3-MW is not believed to be associated with groundwater conditions at LBG-3-MW because:

- The only detection of methyl ethyl ketone from groundwater samples obtained at Well LBG-3-MW was measured in the duplicate sample collected during the first groundwater sampling round.
- The subsequent sampling round did not detect methyl ethyl ketone above the CRL.
- Methyl ethyl ketone is a common laboratory contaminant.

Ten pesticides were detected above CRLs in the groundwater samples collected from Wells LBG-3-MW through LBG-6-MW during groundwater sampling Rounds 1 and 2. Most of these

analytes were detected at concentrations slightly above their corresponding CRL except heptachlor, heptachlor epoxide, isodrin, and delta-benzenehexachloride. Heptachlor and heptachlor epoxide were detected at concentrations of 0.011 and 0.0406 $\mu\text{g/l}$, respectively, in the duplicate groundwater sample from LBG-3-MW during the first sampling round. Heptachlor epoxide was not detected above the CRL (0.0063 $\mu\text{g/l}$), and heptachlor was only detected at approximately 2 times the CRL (0.0025 $\mu\text{g/l}$) in the investigative sample collected from LBG-3-MW during the first groundwater sampling round. In addition, these analytes were not detected at concentrations greater than the corresponding CRL during the second groundwater sampling round. Therefore, the concentrations of heptachlor and heptachlor epoxide detected in the groundwater samples from the first round of groundwater sampling are not believed to be associated with site conditions.

Isodrin was detected at concentrations greater than between 2 and 10 times the CRL (0.0025 $\mu\text{g/l}$) in Wells LBG-4-MW and LBG-5-MW during sampling Rounds 1 and 2. In addition, isodrin was detected during the first round of groundwater sampling in LBG-6-MW at a concentration (0.0268 $\mu\text{g/l}$) 10 times greater than the CRL. Isodrin was detected in the rinsewater quality control (QC) sample collected during the first sampling round at a concentration of 0.00405 $\mu\text{g/l}$. Because isodrin was detected in the rinsewater sample collected during the first sampling round, the concentrations of isodrin detected in the samples could be attributed to the sampling or laboratory processing equipment. Isodrin detections from the second round of sampling were flagged to indicate higher than normal recoveries of associated control analysis. This flag implies that these investigative sample results may be overestimated. Additional follow-up groundwater sampling was then conducted to assess these earlier detections of isodrin. Isodrin was detected in a single groundwater sample (LBG-4-MW) but the result could not be confirmed by the laboratory. A duplicate analysis performed concurrently by a different laboratory did not detect isodrin in concentrations above the reporting limit (see page 9-14 of this document).

The pesticide delta-benzenehexachloride was detected during the second round of groundwater sampling at LBG-6-MW. This analyte was detected at a concentration of 0.0148 $\mu\text{g/l}$, approximately four times the CRL of 0.0034 $\mu\text{g/l}$. However, because this analyte was not detected during both

sampling Rounds 1 and 2 and the detected concentration was only moderately above the CRL, this analyte is not believed to be representative of site conditions.

As shown in Table 9.3, five metals were sporadically detected in groundwater samples collected from Wells LBG-3-MW through LBG-6-MW at concentrations exceeding background concentrations.

Table 9.5 summarizes the TCL metals that are greater than background concentrations. Sodium was consistently detected in Wells LBG-3-MW through LBG-6-MW at concentrations significantly higher than the background concentrations. However, similar levels of sodium were observed in other background groundwater samples (i.e., from BKG-3-HP). Because elevated concentrations of sodium occur throughout the SIAD region, the high concentrations of sodium are believed to be representative of site conditions.

In addition to elevated concentrations of sodium, the groundwater sample collected during the first sampling round (September 17, 1992) at Well LBG-3-MW also contained elevated concentrations of magnesium and potassium. However, these elevated concentrations of magnesium and potassium were not detected in the corresponding duplicate groundwater sample or in the groundwater sample from the second sampling round. Therefore, these elevated concentrations are not believed to be representative of groundwater conditions at LBG-3-MW.

Groundwater samples from Well LBG-5-MW contained arsenic at concentrations similar to the natural values of arsenic detected in other background well/borings to the west of LBG-5-MW. Because of this, the concentrations detected in samples from LBG-5-MW are likely associated with natural groundwater conditions within the region and not a result of site activities. The concentrations of vanadium detected in groundwater during the first and second groundwater sampling (1,090 and 1,920 $\mu\text{g/l}$) are significantly greater than the background concentration. Elevated concentrations of vanadium have not been detected in soil samples analyzed to date, and no known source of vanadium has been identified at the site. Therefore, it does not appear that the elevated concentrations of vanadium are associated with site activities.

Round 3 Follow-up. Acetone and methyl ethyl ketone (2-butanone) were detected in Round 1 and Round 2 groundwater samples; however, these compounds were not detected in Round 3 groundwater samples. Chloroform was detected in a groundwater sample collected from Monitoring Well LBG-5-MW and analyzed by Environmental Science and Engineering, Inc. (ESE), during the Round 3 sampling event; however, chloroform also was detected in the associated rinse blank sample. In addition, chloroform was not detected in the duplicate sample analyzed by DataChem. The presence of these VOCs in the Lower Burning Ground groundwater samples is not likely to be representative of site conditions because the acetone, 2-butanone, and chloroform were only detected sporadically in the groundwater samples, and these VOCs are common laboratory solvents and sample contaminants.

SVOCs were not detected in the Round 1 and Round 2 groundwater samples; however, three SVOCs were detected in the Round 3 groundwater samples. Two of the compounds, pentacosane and tetracosane, were detected in groundwater samples collected from Monitoring Wells LBG-3-MW, LBG-4-MW, and LBG-6-MW that were analyzed by ESE. These compounds are nontarget analytes and were tentatively identified by the laboratory. These compounds were not detected in the duplicate samples analyzed by DataChem. Because pentacosane and tetracosane are TICs and were not detected in the duplicate samples analyzed by DataChem, these compounds are not likely to be representative of site conditions.

The third compound, bis(2-ethylhexyl) phthalate, was detected in the Round 3 groundwater samples analyzed by ESE at concentrations that exceeded the respective federal and state MCLs. However, the compound was detected in the associated laboratory method blank and is likely to be a laboratory contaminant. In addition, the compound was not detected in the duplicate samples analyzed by DataChem. Therefore, the presence of this compound in groundwater samples is not likely to be the result of site-related activities or representative of site conditions. Because bis(2-ethylhexyl) phthalate is a target analyte and was detected in groundwater samples collected from each of the four monitoring wells sampled, bis(2-ethylhexyl) phthalate was included in a human health evaluation (HHE) and an environmental evaluation to provide evidence that it is not present at levels associated with adverse human health and ecological effects.

Pesticides were detected in one or more of the groundwater samples collected at the Lower Burning Ground; however, most of the pesticides were detected in Round 1 groundwater samples with fewer pesticides detected in the Round 2 and Round 3 groundwater samples. With one exception, the Round 3 follow-up groundwater samples did not contain detectable concentrations of pesticides. Isodrin was detected in a single groundwater sample collected from Monitoring Well LBG-4-MW on May 31, 1994. This result could not be confirmed. A duplicate analysis performed concurrently by a different laboratory did not detect isodrin in concentrations above the reporting limit. It is possible that laboratory contamination is responsible for the erratic nature of the detections. However, because isodrin and alpha-benzenehexachloride were detected in samples collected from more than one sampling round, these compounds were included in an HHE and an environmental evaluation to provide evidence that they are not present at levels associated with adverse human health and ecological effects (Appendix U of the Group III B Sites RI [HLA, 1994b]). Heptachlor and heptachlor epoxide also were included in the HHE and environmental evaluation because the concentration of these compounds in groundwater collected from Monitoring Well LBG-3-MW exceeded respective state MCLs; however, they were only detected in one round of analyses.

The explosive 1,3,5-trinitrobenzene was detected in Round 2 groundwater samples collected from Monitoring Wells LBG-3-MW and LBG-6-MW; however, these detections of 1,3,5-trinitrobenzene were not confirmed by the laboratory and 1,3,5-trinitrobenzene was not detected during the Round 1 or Round 3 groundwater sampling events. Therefore, the sporadic detections of 1,3,5-trinitrobenzene are not likely to be the result of site-related activity.

The cations magnesium, potassium, and sodium were detected in one or more of the Lower Burning Ground groundwater samples at concentrations that exceeded background concentrations. Sodium was detected in groundwater samples collected from Monitoring Wells LBG-3-MW through LBG-6-MW at concentrations significantly greater than the site background concentration, and in some samples, greater than the facilitywide background concentration. In addition to elevated concentrations of sodium, the groundwater samples collected from one or more of the monitoring wells contained elevated concentrations of magnesium and potassium. Although the concentrations of these cations occasionally exceeded site and facilitywide background values, activities associated

with the Lower Burning Ground that could result in the raised concentrations of these cations have not been identified. However, similar levels of these cations were observed in other background samples (see Section 5.5 of the Final RI for SIAD Group III B Sites, [HLA, 1994b]) and the concentrations of these cations in the groundwater samples are not likely to be the result of site-related activity.

Metals, including arsenic, lead, iron, manganese, and vanadium, were detected in one or more of the groundwater samples at concentrations that exceeded site or facilitywide background concentrations. Groundwater samples collected at the Lower Burning Ground contained arsenic at concentrations that were greater than the values of arsenic detected in the site background well and exceed federal and state MCLs. However, the maximum concentration of arsenic detected in groundwater at the Lower Burning Ground is less than the concentration of arsenic detected in groundwater samples collected from facilitywide background monitoring wells. Thus, the concentrations of arsenic detected in samples collected from Monitoring Well LBG-5-MW are likely to be associated with natural groundwater conditions within the region and not associated with site activities. The concentrations of vanadium detected in groundwater collected from Monitoring Well LBG-5-MW during sampling Rounds 1, 2, and 3 are significantly greater than the site background concentrations. Elevated concentrations of vanadium have not been detected in soil samples analyzed to date and no known source of vanadium has been identified at the site. Therefore, it does not appear that the elevated concentrations of vanadium are associated with site activities. Iron, lead, and manganese were detected sporadically in groundwater collected from one or more of the monitoring wells and do not appear to be associated with site activities. Because of the relatively high concentrations of arsenic and vanadium detected in the groundwater samples, these metals were assessed in an environmental and human health evaluation (EHHE) (Appendix U of the Group III B Sites RI [HLA, 1994b]), which is summarized in the following section.

9.2.6 Summary of Site Risks

This section presents a review of the baseline risk assessment conducted for the Lower Burning Ground during the Group III B Sites RI/FS. Soil, including both surface and subsurface soil, is the only medium of concern at the site potentially requiring action, based on the results of the EHHE

(HLA, 1994b). Results of EHHEs for both soil and groundwater are presented in the following discussion.

9.2.6.1 Chemicals of Potential Concern

Soil

Surface soil consists of the soil or sediments from ground surface to 0.5 foot bgs and is the primary soil zone of concern. Subsurface soil at the Lower Burning Ground is of concern primarily because buried UXO is present.

The COPCs identified in the EHHE for the site surface soil were the following:

- 1,3,5-Trinitrobenzene
- Arsenic
- Beryllium
- Chromium (total)
- Lead
- Manganese
- Nickel
- Thallium

Groundwater

The COPCs identified in the EHHE for groundwater at the site consisted of:

- bis(2-ethylhexyl)phthalate
- Alpha-benzenehexachloride
- Heptachlor
- Heptachlor epoxide
- Isodrin
- Arsenic
- Vanadium

9.2.6.2 Contaminant Fate and Transport

The following is a discussion of contaminant fate and transport for the media of concern at the Lower Burning Ground soil.

Metals are not prone to volatilization; however, they may become entrained in air with dusts. The same is true for the one organic chemical present, 1,3,5-trinitrobenzene, which is typically classified as an SVOC. Even though 1,3,5-trinitrobenzene has a moderate water solubility (Merck, 1983; Ney, 1981) and only moderate soil sorption tendency (Spanggord et al., 1979; Kenaga and Goring, 1978; Dragun, 1988), entrainment with suspended dusts may be significant due to the infrequency of rain events at the site. Because all seven metals and the one organic COPC are found in surface soil, inhalation of entrained dusts by both current and future receptors may be an important exposure pathway.

The metal COPCs in surface soil will not tend to be mobilized by surface runoff in significant concentrations. As noted above, one organic COPC, 1,3,5-trinitrobenzene, has moderate water solubility and a moderate soil sorption tendency, and consequently may be prone to runoff. However, the low frequency of rainfall events combined with the relatively low surface-soil concentrations of 1,3,5-trinitrobenzene are expected to result in insignificant runoff potential. Additionally, the geographic relief of the Lower Burning Ground does not provide for surface runoff at this site.

9.2.6.3 Exposure Routes and Receptors

Soil

Many receptor populations and exposure pathways were evaluated for the site in the EHHE (HLA, 1994b), as shown in Figure 9.4. Several pathways identified in the EHHE were eliminated on the basis of the following considerations: (1) present land use and projected future land use, (2) low levels of risk as presented in Table 9.4, and (3) presence of UXO.

Present and projected future land use is a fundamental component when evaluating the relevance of potential exposure pathways. Land use assumptions provide the basis for identifying potential

exposure pathways and developing the corresponding contaminant levels that are protective of human health and the environment. Future residential land use at SIAD is extremely unlikely; therefore, the residential exposure scenarios were not considered in developing RAOs for the FS. (Based on local city and county planning documents, including the Master Environmental Assessment for Lassen Southeast Planning Area [Lassen County Planning Department, June 1990]; the Wendel Area Plan and Environmental Impact Report [Resource Concepts, 1987]). Although SIAD has been targeted for realignment by the Base Closure and Realignment Committee (BRAC), transfer of this land to the public for residential use remains infeasible due to the buried UXO and deed restrictions attached to this site.

The NCP supports selection of a future land use other than residential occupancy before a ROD is developed. The NCP provides the following:

The analysis for potential exposure under future land use conditions is used to provide decision-makers with an understanding of exposures that may potentially occur in the future. This analysis should include a qualitative assessment of the likelihood that the assumed future land use will occur. The reasonable maximum exposure estimate for future uses of the site will provide the basis for the development of protective exposure levels.

In general, a baseline risk assessment will look at a future land use that is both reasonable, from land use development patterns, and may be associated with the highest (most significant) risk, in order to be protective. The assumption of residential land use is not a requirement of the program but rather is an assumption that may be made, based on conservative but realistic exposures. An assumption of future residential land use may not be justifiable if the probability that the site will support residential use in the future is small (55 Federal Regulations 8710).

The level of risk associated with a potential exposure pathway, as characterized in the EHHE, is a measure of the endangerment the potential exposure pathway may pose to receptors. It has been conservatively assumed that average conditions associated with potential exposure pathways that contribute excess cancer risks less than 1×10^{-6} and noncarcinogenic hazard quotients less than 1.0, as assessed by the EHHE (and in accordance with NCP), may be considered to be protective of human health.

The presence of UXO eliminates any potential onsite receptors and, therefore, eliminates any pathways associated with onsite chemical exposure. UXO presents a physical hazard, rather than a

chemical hazard. As agreed to by the signatories of the FFA, access and land use restrictions shall be placed on this site due to the known presence of UXO.

Based on the three pathways eliminated above, the following receptor populations and exposure pathways were quantified in the EHHE.

Current Scenario

- Offsite Resident Farmer
 - Inhalation of dust from outdoor air
 - Inhalation of dust from indoor air

Future Scenario

- Onsite Construction Worker
 - Inhalation of dust from outdoor air
 - Ingestion of soil
 - Dermal contact with soil
- Onsite Resident
 - Inhalation of dust from outdoor air
 - Inhalation of dust from indoor air
 - Ingestion of soil
 - Dermal contact with soil

The results of the quantification of exposure pathways presented in the EHHE indicated the following:

- Noncarcinogenic health effects are not of concern for the current and future receptors evaluated. (An HI of less than 1.0 was estimated.) HIs greater than 1.0 were estimated for future receptors due primarily to ingestion of thallium in soil.
- Carcinogenic risk estimates for current receptors ranged from 6×10^{-6} to 4×10^{-5} for the average scenario and from 3×10^{-5} to 1×10^{-4} for the RME scenario. Carcinogenic risk estimates for future receptors ranged from 2×10^{-6} to 9×10^{-5} for the average scenario and from 3×10^{-6} to 3×10^{-4} for the RME scenario. Risks above EPA's acceptable range of 1×10^{-4} to 1×10^{-7} were due primarily to inhalation of chromium and arsenic.
- Estimated blood levels of lead were well below target levels, indicating an acceptable risk, for all current and future receptors evaluated.

Groundwater

The potential for exposure to groundwater is low because of its limited value as a source of water for domestic use. However, for this evaluation, human exposure to groundwater at the Lower Burning Ground was considered to be possible via the ingestion pathway.

Hypothetical receptors were identified as part of this HHE. The site is inactive with no regular or intermittent visits onsite by civilian or military workers, no residences onsite, and with controlled access. The human risk associated with a full-time resident using groundwater from the Lower Burning Ground for drinking and other domestic use was evaluated conservatively. The potentially complete exposure pathway is residential ingestion of the groundwater.

9.2.6.4 Human Health Risks

Soil

The results of the human health risk estimation for both current and future receptors are summarized in Table 9.4. For current receptors, all possible adverse noncancer health effects and cancer risks were below levels of regulatory concern. For hypothetical future residents, the maximum estimated HI of 30 indicates the possibility that adverse noncancer health effects (primarily associated with thallium [ingestion]) may be of concern at this site in the future. The cancer risk estimates for current and hypothetical future receptors ranged from 2×10^{-6} for the average scenario to 3×10^{-4} for the RME scenario. The high end of this range indicates that possible cancer risk exceeds the range of acceptable risk and was due primarily to inhalation of chromium in dust and ingestion of arsenic in soil for the future hypothetical composite child/adult resident receptor. However, it should be noted that the total chromium concentrations in soil were conservatively treated as hexavalent chromium, causing the risk estimates to be higher than actual conditions would warrant. In addition, the arsenic concentrations encountered in soil at the site are considered a natural condition, as discussed in Sections 5.2.4 and 5.3 of the Final Group III B Sites RI Report (HLA, 1994b).

Exposures to lead at the Lower Burning Ground were evaluated separately from exposures to the other COPCs. Modeling results indicated that adverse health effects from lead exposure are not expected for the current receptors, the offsite resident farmers. For hypothetical future residents,

adverse health effects from lead exposure may be of concern for children (average and RME scenarios) and adults (RME scenario) if the postulated exposure conditions were to occur in the future. For hypothetical future construction workers, adverse health effects from lead exposure may also be of concern under the postulated RME conditions. However, significant adverse effects were associated only with future RME conditions that are hypothetical and conservative and unlikely to occur. Due to the presence of UXO at the site, it is highly unlikely that the Lower Burning Ground area would ever be zoned as residential. The potential physical hazards of UXO are more of a concern than the potential chemical hazards at the site.

Groundwater

A screening-level HHE of selected analytes detected in groundwater samples was performed to (1) provide an analysis of the maximum possible baseline risks potentially posed by chemicals in groundwater and (2) provide a basis for estimating levels of chemicals that can remain onsite and still be adequately protective of human health. This HHE was conducted with the knowledge that groundwater beneath the Lower Burning Ground is not potable and unlikely to be used domestically for reasons discussed in the Final RI for SIAD Group III B Sites (HLA, 1994b). These reasons include the following:

- The concentration of dissolved solids in groundwater samples exceeded federal MCLs of 500 milligrams per liter (mg/l) (EPA, 1993); therefore, groundwater at this site was not considered potable. However, it is recognized that the California Regional Water Quality Control Board has designated the entire Honey Lake Basin as a municipal drinking water source.
- Four PSWs are located near the southern boundary of the Main Depot supplying both the Depot and the adjacent town of Herlong; it was assumed that hypothetical future onsite residents at the site would receive domestic water supplies from these wells.
- A hydraulic connection is not known to exist between the aquifer sampled at the Lower Burning Ground and the aquifer that supplies the four PSWs (HLA, 1994b).

A toxicity assessment for the chemicals of potential concern was performed for the HHE. Toxicity values for each of the chemicals of potential concern were developed as described in Section 6.3 of the Final RI for SIAD Group III B Sites (HLA, 1994b). Specific California cancer potency factors were used where available. An EPA or California potency factor (or reference dose) is not available for isodrin. Therefore, isodrin was not included in the risk calculations.

Maximum concentrations for the chemicals of potential concern, as listed in Table 9.4, were used in the risk evaluation. EPA default exposure factors for a RME scenario were used (EPA, 1991). These factors are combined into an intake factor that, when multiplied by the groundwater concentration, results in an average daily intake for a specific chemical. These intake factors, along with the groundwater concentrations and the risk values, are provided in Table 9.5.

Screening-level human health risks for hypothetical residents using groundwater from the Lower Burning Ground were evaluated for adverse noncarcinogenic health effects and for carcinogenic risk. An HI was calculated to evaluate the potential for adverse noncarcinogenic health effects. The HI for the RME scenario is 163, of which 95 percent (an HI of 155) is contributed by the maximum concentration of arsenic. The majority of the remaining hazard index is contributed by vanadium, which has an individual hazard quotient of 7.8.

The RME carcinogenic risk estimate for a potential resident using groundwater is 3.5×10^{-2} . Arsenic contributes almost 100 percent of the estimated carcinogenic risk.

Background arsenic concentrations in SIAD are naturally high with a maximum detected background concentration of 5,300 $\mu\text{g/l}$. The maximum concentration detected in groundwater at the Lower Burning Ground and used in the risk estimation is 1,700 $\mu\text{g/l}$. The elevated risks associated with groundwater appear to reflect naturally occurring arsenic and are not site activities. The incremental site risks associated with arsenic are insignificant because the background and onsite levels are similar.

Isodrin is an isomer of aldrin. If aldrin is used as a surrogate for isodrin and a slope factor of 17 milligrams per kilogram body weight per day (mg/kg-day) is assumed for isodrin, the maximum concentration of 0.0000279 mg/l would be associated with an estimated risk of 5.5×10^{-6} . As with the compounds listed in Table 9.5, the estimated risk for isodrin is far exceeded by the risk associated with the arsenic groundwater concentrations.

9.2.6.5 Environmental Risks

A qualitative EE was performed for SIAD. The purpose of the EE was to evaluate the potential for adverse effects to ecological receptors as a result of possible exposure to chemicals originating from chemical source areas. The potential for aluminum and thallium toxicity was indicated for the Townsend's ground squirrel, sage grouse, and the burrowing owl as a result of incidental soil ingestion at the Lower Burning Ground. Conclusions regarding the potential for zinc toxicity to the sage grouse as a result of direct and indirect ingestion of soil at the Lower Burning Ground could not be made because insufficient avian toxicity data are available for zinc. It is not known whether the sage grouse, Townsend's ground squirrel, or the burrowing owl actually inhabit the 62-acre Lower Burning Ground, but because of the large acreage associated with the site, this possibility was not ruled out. The potential also exists for toxicity to Indian rice grass as a result of maximum concentrations of zinc present in soil at the site.

An EE of the groundwater at the Lower Burning Ground was not performed because the groundwater depth (in excess of 17 feet bgs) makes the groundwater inaccessible to biota that might frequent the site.

9.2.7 Description of the No Action Alternative

Based on the results of the baseline risk assessments performed during the RI/FS for the Lower Burning Ground, there is no adverse impact to human health or the environment from site-related activities. The only enhanced risks appear to be from naturally occurring levels of arsenic and thallium in the soil to a hypothetical future resident. Thus, the No Action alternative is supported by the baseline risk assessment discussed in Section 9.2.6 and the Administrative Record. Additionally, the presence of UXO at the site will prevent any future development of the site for residential use. The Lower Burning Ground is an isolated site in an inner secured area of SIAD and the solitary site access road is currently closed with a locked gate. The placement of deed and/or access restrictions on the site will restrict future use that could be harmful to human health.

9.2.8 Explanation of Significant Changes

The Proposed Plan for the nine sites was released to the public for comment on February 1, 1996. The preferred alternative identified for the Lower Burning Ground was No Action. Based on the

absence of any new information or comments during the public comment period, no significant changes to the selected remedy for the Lower Burning Ground outlined in the Proposed Plan for Nine Sites were necessary.

9.3 Responsiveness Summary

The public comment period for the Proposed Plan for Nine Sites at SIAD began on February 7, 1996, and extended through March 7, 1996. No written comments were received by the Army or regulatory agencies. The public meeting presenting the Proposed Plan was held on February 22, 1996. No oral comments were received regarding the Lower Burning Ground at the public meeting.

**Table 9.1: Summary of Soil-Gas Sampling
Lower Burning Ground**

| Compound* | Number of Samples With Detections | Min Conc ($\mu\text{g/l}$) | Max Conc ($\mu\text{g/l}$) | Sample(s) With Max Conc |
|-----------------------------|---|------------------------------------|------------------------------------|-------------------------------|
| Methylene chloride | 0 | NA | NA | NA |
| Trichlorofluoromethane | 0 | NA | NA | NA |
| Chloroform | 0 | NA | NA | NA |
| 1,2-Dichloroethene | 0 | NA | NA | NA |
| 1,1,1-Trichloroethane | 3 | 0.0009 | 0.003 | LBG-11 |
| Carbon tetrachloride | 0 | NA | NA | NA |
| Trichloroethene | 1 | NA | 0.1 | LBG-73 |
| Tetrachloroethene | 0 | NA | NA | NA |
| Benzene | 0 | NA | NA | NA |
| Toluene | 0 | NA | NA | NA |
| Ethylbenzene | 0 | NA | NA | NA |
| Xylenes | 0 | NA | NA | NA |
| Total volatile hydrocarbons | 6 | 0.4 | 14 | LBG-75 |

Site identifications were labeled sequentially, total of 95 samples.

$\mu\text{g/l}$ Micrograms per liter
 Conc Concentration
 Max Maximum
 Min Minimum
 NA Not applicable

* Compounds are listed in elution order.

Table 9.2: Summary of Analyte Concentrations in Surface-Soil Samples That are Greater Than Background Concentrations - Lower Burning Ground^a

| Depth (feet): Sample Date: Soil Type: | Minimum ^b Background Concentration | Maximum ^b Background Concentration | SIAD-wide Background Concentrations ^c | LBG-1-SS | LBG-1-SS-D | LBG-2-SS | LBG-3-SS |
|---|---|---|--|----------------------|----------------------|----------------------|----------------------|
| | 0 Not applicable 325 and 330 | 0 Not applicable 325 and 330 | NS Not applicable NS | 0 08/21/92 330 | 0 08/21/92 330 | 0 08/20/92 330 | 0 08/26/92 330 |
| Inorganic Analytes | | | | | | | |
| Aluminum | 12,100 | 29,200 | 1,780 to 29,200 | 51,200 | 37,900 | 25,900 | 41,700 |
| Arsenic | 0.500 | 4.63 | 0.500 to 18.0 | --- | --- | 5.46 | 6.06 |
| Barium | 223 | 609 | 41.4 to 630 | --- | --- | --- | --- |
| Cadmium | 0.589 | 3.05 | 0.589 to 3.05 | 4.32 | 4.45 | --- | 11.8 |
| Chromium | 9.44 | 23.0 | 4.05 to 31.0 | --- | --- | 23.2 | 35.7 |
| Cobalt | 5.80 | 15.0 | 1.38 to 15.0 | --- | --- | --- | --- |
| Copper | 16.2 | 58.6 | 3.07 to 58.6 | 1,300 | 1,500 | 66.4 | 1,400 |
| Cyanide | NA | NA | NA | <0.25 | <0.25 | <0.25 | <0.25 |
| Iron | 12,600 | 29,200 | 3,330 to 29,200 | 31,400 | 30,300 | 33,300 | 40,300 |
| Lead | 0.170 | 10.5 | 0.170 to 10.5 | 130 | 89 | --- | 400 |
| Magnesium | 7,780 | 15,000 | 1,400 to 26,600 | --- | --- | --- | 15,700 |
| Manganese | 453 | 781 | 57.7 to 781 | 816 | --- | 805 | 877 |
| Mercury | 0.0500 | 0.0500 | 0.0500 | --- | --- | --- | 0.064 |
| Nickel | 8.20 | 21.6 | 0.24 to 22.4 | --- | --- | --- | 24.4 |
| Potassium | 3,850 | 9,100 | 1,230 to 9,100 | --- | --- | --- | 10,100 |
| Silver | 0.0250 | 2.50 | 0.250 to 2.50 | --- | --- | --- | 3.66 |
| Sodium | 721 | 6,240 | 352 to 18,500 | --- | --- | --- | 6,790 |
| Thallium | 6.62 | 62.9 | 6.38 to 62.9 | --- | --- | 143 | --- |
| Vanadium | 30.1 | 63.0 | 9.76 to 130 | 65.3 | --- | 66.1 | --- |
| Zinc | 26.8 | 73.3 | 8.03 to 8.42 | 236 | 806 | 161 | 11,000 |

**Table 9.2: Summary of Analyte Concentrations in Surface-Soil Samples That are Greater Than Background Concentrations - Lower Burning Ground*
(Continued)**

| Depth (feet) Sample Date: Soil Type | LGB-4-SS | | LGB-5-SS | | LGB-6-SS | | LGB-7-SS | | LGB-8-SS | | LGB-9-SS | | LGB-10-SS | |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|----------|
| | 0 | 08/20/92 | 0 | 08/20/92 | 0 | 08/26/92 | 0 | 08/26/92 | 0 | 08/21/92 | 0 | 08/21/92 | 0 | 08/21/92 |
| | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 |
| Inorganic Analytes | | | | | | | | | | | | | | |
| Aluminum | 28,700 | --- | 29,600 | --- | 33,200 | --- | 44,400 | --- | 32,600 | --- | 61,400 | --- | 41,000 | --- |
| Arsenic | --- | --- | --- | --- | --- | --- | --- | --- | 14.8 | --- | 5.91 | --- | --- | --- |
| Barium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 654 | --- | --- | --- |
| Cadium | --- | --- | --- | --- | 3.65 | --- | --- | --- | 3.65 | --- | --- | --- | --- | --- |
| Chromium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 30.8 | --- | 23.6 | --- |
| Cobalt | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 21.4 | --- | 16.7 | --- |
| Copper | --- | --- | --- | --- | --- | --- | 476 | --- | 386 | --- | 70.7 | --- | --- | --- |
| Cyanide | <0.25 | --- | 0.78 | --- | 0.26 | --- | <0.25 | --- | <0.25 | --- | <0.25 | --- | <0.25 | --- |
| Iron | --- | --- | 30,300 | --- | 32,400 | --- | 31,000 | --- | 40,800 | --- | 52,300 | --- | 40,800 | --- |
| Lead | --- | --- | --- | --- | 24 | --- | 4,500 | --- | 31 | --- | 14.2 | --- | 19.5 | --- |
| Magnesium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 20,000 | --- | --- | --- |
| Manganese | 864 | --- | 819 | --- | 879 | --- | 795 | --- | --- | --- | 846 | --- | 869 | --- |
| Mercury | --- | --- | --- | --- | --- | --- | --- | --- | 0.164 | --- | --- | --- | --- | --- |
| Nickel | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 28.4 | --- | 22.4 | --- |
| Potassium | 11,100 | --- | 9,660 | --- | 11,000 | --- | 9,700 | --- | --- | --- | 14,000 | --- | 10,700 | --- |
| Silver | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sodium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 7,700 | --- | --- | --- |
| Thallium | 120 | --- | 131 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vanadium | --- | --- | --- | --- | --- | --- | --- | --- | 8,860 | --- | --- | --- | --- | --- |
| Zinc | --- | --- | 80.2 | --- | 108 | --- | 169 | --- | 93.2 | --- | 98.2 | --- | 63.1 | --- |
| | | | | | | | | | 1,700 | | 99.4 | | 120 | |

Table 9.2: Summary of Analyte Concentrations in Surface-Soil Samples That are Greater Than Background Concentrations - Lower Burning Ground^a
(Continued)

| | |
|-----|---|
| < | Less than certified reporting limits |
| --- | Analyte not detected at levels exceeding background |
| NA | Not available |
| NS | Not specified |
| a. | Values are reported in milligrams per kilogram. |
| b. | Minimum and maximum concentrations for background surface-soil types 325 and 330 taken from Table 5.4 of the Group III B Sites RI Final Report (HLA, 1994). |
| c. | Taken from Table 5.16 of the Group III B Sites RI Final Report (HLA, 1994). |

Table 9.3: Summary of Analyte Concentrations in Groundwater - Lower Burning Ground^a
(continued)

| Sample Date: | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f | 09/17/92 | 12/09/92 | 05/31/94 ^f |
|--|-------------------------|------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|------------------------|
| Volatile Organic Compounds | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Acetone | <8.0 | 20 | <13.0 | <8.0 | <8.0 | <13.0 | <8.0 | <8.0 | <13.0 | <8.0 | <8.0 | <13.0 | <8.0 | <8.0 | <13.0 | <8.0 | <8.0 | <13.0 | <8.0 | <8.0 | <13.0 | <8.0 | <8.0 | <13.0 | <8.0 | <8.0 | <13.0 |
| Methylene ketone/2-Butanone | 160 ^d | 71 | <6.4 | <10.0 | <10.0 | <6.4 | <10.0 | <10.0 | <6.4 | <10.0 | <10.0 | <6.4 | <10.0 | <10.0 | <6.4 | <10.0 | <10.0 | <6.4 | <10.0 | <10.0 | <6.4 | <10.0 | <10.0 | <6.4 | <10.0 | <10.0 | <6.4 |
| Chloroform | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 | <1.0 | <1.0 | <0.5 |
| Semivolatile Organic Compounds | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| bis(2-Ethylhexyl) phthalate | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 | <7.7 | <7.7 | 11 |
| Pentacosane | ND | ND | 30 S | ND | ND | 30 S | ND | ND | 30 S | ND | ND | 30 S | ND | ND | 30 S | ND | ND | 30 S | ND | ND | 30 S | ND | ND | 30 S | ND | ND | 30 S |
| Tetracosane | ND | ND | 20 S | ND | ND | 20 S | ND | ND | 20 S | ND | ND | 20 S | ND | ND | 20 S | ND | ND | 20 S | ND | ND | 20 S | ND | ND | 20 S | ND | ND | 20 S |
| Pesticides/PCBs | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane(ddd) | <0.0025 | 0.0041 HU | <0.0340 | <0.002 | <0.0025 H | <0.0340 | <0.002 | <0.0025 H | <0.0340 | <0.002 | <0.0025 H | <0.0340 | <0.002 | <0.0025 H | <0.0340 | <0.002 | <0.0025 H | <0.0340 | <0.002 | <0.0025 H | <0.0340 | <0.002 | <0.0025 H | <0.0340 | <0.002 | <0.0025 H | <0.0340 |
| 2,2-bis(p-Chlorophenyl)-1,1-dichloroethane(dde) | 0.0058 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 | <0.003 | <0.0039 H | <0.027 |
| Aldrin | 0.0156 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 | 0.013 | <0.0074 H | <0.018 |
| Heptachlor | <0.0025 | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 | <0.0025 H | <0.0025 H | <0.0423 |
| Heptachlor epoxide | <0.0063 | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 | <0.0063 H | <0.0063 H | <0.0245 |
| Isodrin | 0.0242 | 0.0109 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g | 0.052 | 0.0279 HU | 0.0036 U ^g |
| Lindane | 0.0059 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 | 0.0030 | <0.0025 H | <0.0507 |
| alpha-Benzenhexachloride | 0.0047 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 | 0.0053 | <0.0025 H | <0.0385 |
| alpha-Endosulfan/endosulfan I | 0.0059 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 | 0.0053 | <0.0025 H | <0.0230 |
| delta-Benzenhexachloride | <0.0034 | 0.0037 HU | <0.0293 | <0.003 | <0.0034 H | <0.0293 | <0.003 | <0.0034 H | <0.0293 | <0.003 | <0.0034 H | <0.0293 | <0.003 | <0.0034 H | <0.0293 | <0.003 | <0.0034 H | <0.0293 | <0.003 | <0.0034 H | <0.0293 | <0.003 | <0.0034 H | <0.0293 | <0.003 | <0.0034 H | <0.0293 |
| Explosives | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,3,5-Trinitrobenzene | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 | <0.210 | <0.210 | <0.449 |
| Inorganic Analytes | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Arsenic | 69 ^d | 49.6 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d | <77.5 | 390 ^d | 500 ^d |
| Iron | <77.5 | <4.47 | <38.8 | 790 ^d | <340 K | <38.8 | 790 ^d | <340 K | <38.8 | 790 ^d | <340 K | <38.8 | 790 ^d | <340 K | <38.8 | 790 ^d | <340 K | <38.8 | 790 ^d | <340 K | <38.8 | 790 ^d | <340 K | <38.8 | 790 ^d | <340 K | <38.8 |
| Lead | <4.47 | <4.47 | 2.98 | <22 K | <22 K | 8.0 ^d | <22 K | <22 K | 8.0 ^d | <22 K | <22 K | 8.0 ^d | <22 K | <22 K | 8.0 ^d | <22 K | <22 K | 8.0 ^d | <22 K | <22 K | 8.0 ^d | <22 K | <22 K | 8.0 ^d | <22 K | <22 K | 8.0 ^d |
| Magnesium | 310,000 | 188,000 | 84,900 | 280,000 | 480,000 | 330,000 | 280,000 | 480,000 | 330,000 | 280,000 | 480,000 | 330,000 | 280,000 | 480,000 | 330,000 | 280,000 | 480,000 | 330,000 | 280,000 | 480,000 | 330,000 | 280,000 | 480,000 | 330,000 | 280,000 | 480,000 | 330,000 |
| Manganese | 323 | 1,020 ^d | 128 | 217 | 205 | 67.1 | 217 | 205 | 67.1 | 217 | 205 | 67.1 | 217 | 205 | 67.1 | 217 | 205 | 67.1 | 217 | 205 | 67.1 | 217 | 205 | 67.1 | 217 | 205 | 67.1 |
| Potassium | <250,000 | 261,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 | <250,000 | 490,000 ^d | 158,000 |
| Sodium | 15,000,000 ^d | 9,800,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d | 15,000,000 ^d | 20,000,000 ^d | 7,300,000 ^d |
| Vanadium | <27.6 | <27.6 | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 | 1,090 ^d | 1,820 ^d | 64.5 |

Table 9.3: Summary of Analyte Concentrations In Groundwater - Lower Burning Ground"
(continued)

| | |
|--|--|
| Values in bold exceed federal or state maximum contaminant levels. | |
| Analytical results reported by DataChem except as indicated. | |
| < | Less than certified reporting limit |
| DataChem | DataChem Laboratories, Inc. |
| dup | Duplicate analysis |
| ESE | Environmental Science and Engineering, Inc. |
| H | Out of control due to high quality control spike recoveries, but data accepted |
| I | Interferences in sample make quantitation and/or identification suspect |
| J | Value is estimated |
| K | Reported results are affected by interferences or high background |
| LBG | Lower Burning Ground |
| N/L | No maximum contaminant level for the respective analyte |
| N | Nontarget compound |
| NA | Background samples were not analyzed for organic compounds |
| NC | Non-USAEQ performance demonstrated limit |
| ND | Non-target analyte was not detected |
| S | Tentatively identified compound |
| U | Analysis is unconfirmed |

- a. Values are reported in micrograms per liter.
b. Maximum concentrations for Lower Burning Ground and facilitywide background groundwater samples taken from Tables 5.13 and 5.15, respectively, of the Group III B Sites Final RI report.
c. Value exceeds concentrations representative of LBG background.
d. Treatment technique action level.
e. Analytical results reported by ESE.
f. Analytical results reported by DataChem.
g. Analytical results reported by DataChem.

**Table 9.4: Summary of Multipathway Exposures at the
Lower Burning Ground**

| Receptor Populations Exposure Pathways | Hazard Index | | Potential Upperbound Excess Cancer Risk | |
|--|--------------|----------|--|----------|
| | Average | RME | Average | RME |
| Current Scenario | | | | |
| Child/Adult Residents (Offsite) | | | | |
| Inhalation of Dust from Outdoor Air | 4.77E-02 | 8.89E-02 | 8.93E-06 | 2.96E-05 |
| Inhalation of Dust from Indoor Air | 1.55E-01 | 2.24E-01 | 2.76E-05 | 7.52E-05 |
| Multipathway Exposures | 2E-01 | 3E-01 | 4E-05 | 1E-04 |
| Adult Residents (Offsite) | | | | |
| Inhalation of Dust from Outdoor Air | 2.20E-03 | 4.95E-03 | 4.56E-07 | 3.71E-06 |
| Inhalation of Dust from Indoor Air | 2.76E-02 | 4.11E-02 | 5.74E-06 | 3.08E-05 |
| Multipathway Exposures | 3E-02 | 5E-02 | 6E-06 | 3E-05 |
| Future Scenario | | | | |
| Construction Workers (Onsite) | | | | |
| Ingestion of Soil | 1.34E-01 | 3.87E-01 | 4.05E-07 | 1.00E-06 |
| Dermal Contact with Soil | 7.50E-03 | 6.80E-02 | 2.13E-08 | 1.62E-07 |
| Inhalation of Dust from Outdoor Air | 6.95E-02 | 9.07E-02 | 1.60E-06 | 2.29E-06 |
| Multipathway Exposures | 2E-01 | 5E-01 | 2E-06 | 3E-06 |
| Child/Adult Residents (Onsite) | | | | |
| Ingestion of Soil | 6.84E+00 | 2.02E+01 | 1.82E-05 | 5.29E-05 |
| Dermal Contact with Soil | 6.73E-01 | 4.79E+00 | 1.77E-06 | 2.19E-05 |
| Inhalation of Dust from Outdoor Air | 9.53E-02 | 1.78E-01 | 1.79E-05 | 5.93E-05 |
| Inhalation of Dust from Indoor Air | 3.12E-01 | 4.47E-01 | 5.52E-05 | 1.51E-04 |
| Multipathway Exposures | 8E+00 | 3E+01 | 9E-05 | 3E-04 |
| Adult Residents (Onsite) | | | | |
| Ingestion of Soil | 1.27E+00 | 1.87E+00 | 4.25E-06 | 1.75E-05 |
| Dermal Contact with Soil | 1.57E-01 | 1.18E+00 | 4.87E-07 | 9.97E-06 |
| Inhalation of Dust from Outdoor Air | 4.40E-03 | 9.93E-03 | 9.13E-07 | 7.41E-06 |
| Inhalation of Dust from Indoor Air | 5.53E-02 | 8.22E-02 | 1.15E-05 | 6.17E-05 |
| Multipathway Exposures | 1E+00 | 3E+00 | 2E-05 | 1E-04 |

RME Reasonable maximum exposure

**Table 9.5: Risk Calculations Potential Adult Resident
Ingestion of Groundwater - Reasonable Maximum Exposure
Lower Burning Ground**

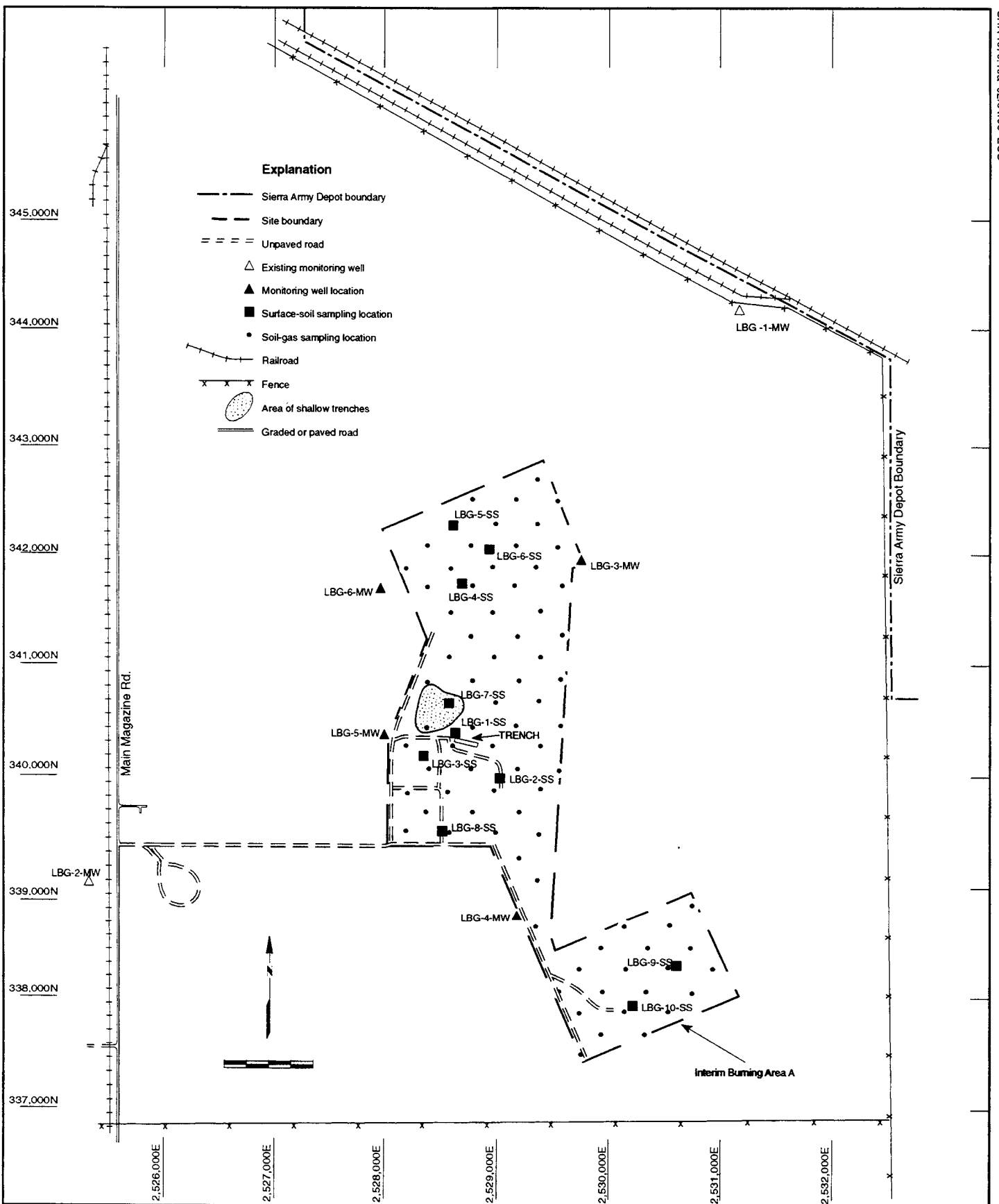
Carcinogenic Risk

| Chemical | Chemical Concentration (mg/l) | Ingestion Intake Factor (l/kg-day) | Daily Intake (mg/kg-day) | Slope Factor (mg/kg-day) ⁻¹ | Carcinogenic Risk | Percent of Total |
|----------------------------|-------------------------------------|--|--------------------------------|--|----------------------|---------------------|
| Arsenic | 1.70E+00 | 1.17E-02 | 2.00E-02 | 1.75E+00 | 3.49E-02 | 100.0 |
| Bis-2(ethylhexyl)phthalate | 1.60E-02 | 1.17E-02 | 1.88E-04 | 8.40E-03 | 1.58E-06 | 0.0 |
| Heptachlor | 2.12E-05 | 1.17E-02 | 2.49E-07 | 5.70E+00 | 1.42E-06 | 0.0 |
| Heptachlor epoxide | 4.06E-05 | 1.17E-02 | 4.77E-07 | 1.30E-01 | 6.20E-08 | 0.0 |
| alpha-BHC, alpha-Lindane | 1.93E-05 | 1.17E-02 | 2.27E-07 | 6.30E+00 | <u>1.43E-06</u> | 0.0 |
| Total Risk: | | | | | 3.49E-02 | |

Hazard Index - Chronic

| Chemical | Chemical Concentration (mg/l) | Ingestion Intake Factor (l/kg-day) | Daily Intake (mg/kg-day) | Chronic RfD (mg/kg-day) | Hazard Quotient | Percent of HI |
|----------------------------|-------------------------------------|--|--------------------------------|-------------------------------|--------------------|------------------|
| Arsenic | 1.70E+00 | 2.74E-02 | 4.66E-02 | 3.00E-04 | 1.55E+02 | 95.1 |
| Bis-2(ethylhexyl)phthalate | 1.60E-02 | 2.74E-02 | 4.38E-04 | 2.00E-02 | 2.19E-02 | 0.0 |
| Heptachlor | 2.12E-05 | 2.74E-02 | 5.81E-07 | 5.00E-04 | 1.16E-03 | 0.0 |
| Heptachlor epoxide | 4.06E-05 | 2.74E-02 | 1.11E-06 | 1.30E-05 | 8.56E-02 | 0.1 |
| Vanadium | 2.00E+00 | 2.74E-02 | 5.48E-02 | 7.00E-03 | <u>7.83E+00</u> | 4.8 |
| Hazard Index: | | | | | 1.63E+02 | |

HI Hazard index
 l/kg-day Liters per kilogram body weight day
 mg/kg-day Milligrams per kilogram body weight day
 mg/l Milligrams per liter
 RfD Reference dose



Prepared for:
 U.S. Army Environmental Center
 Aberdeen Proving Ground, Maryland
 Sierra Army Depot, Lassen County, California

Figure 9.1
 Soil-Gas, Soil Boring, Surface-Soil, and
 Monitoring Well Locations -
 Lower Burning Ground

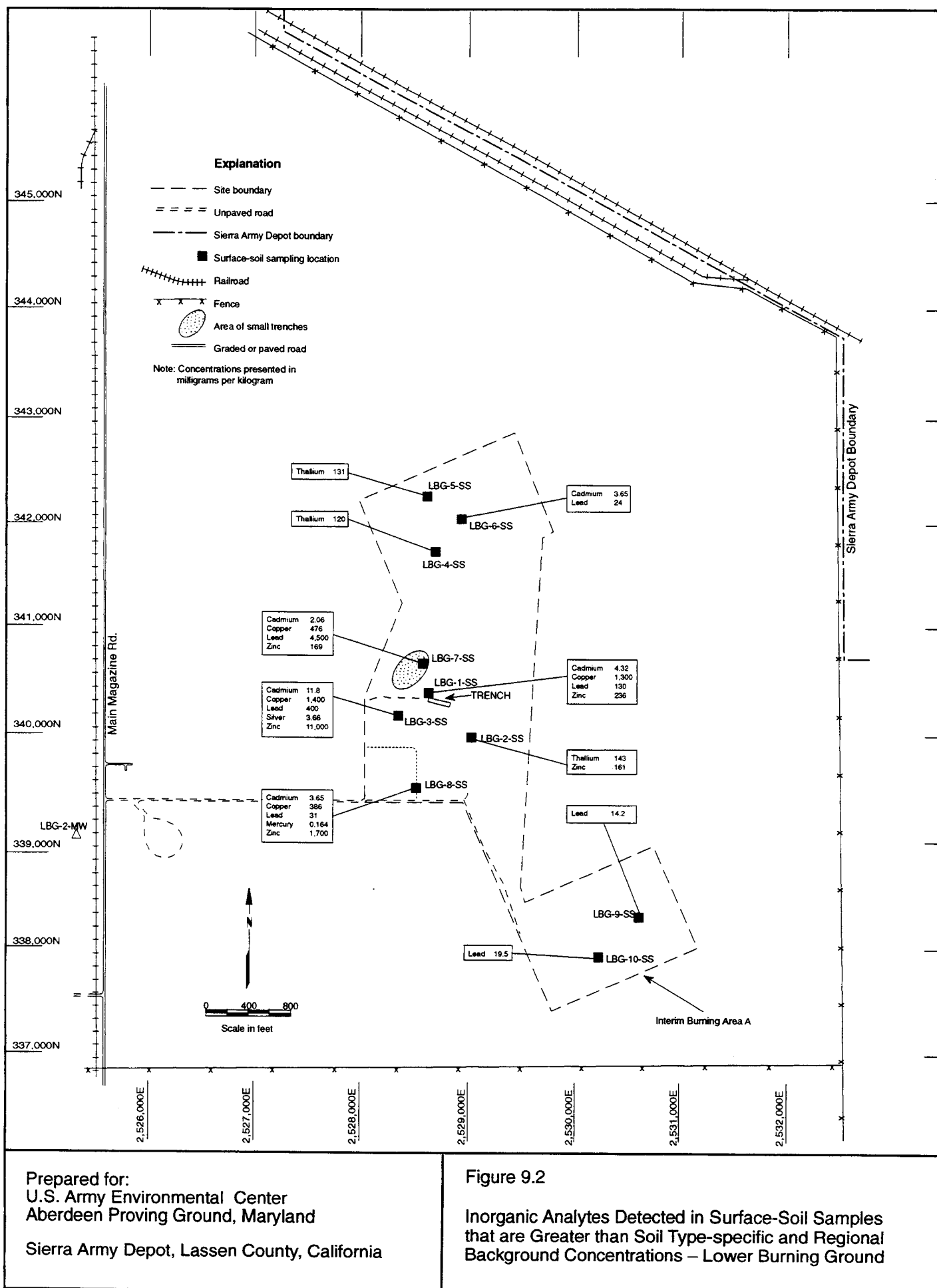
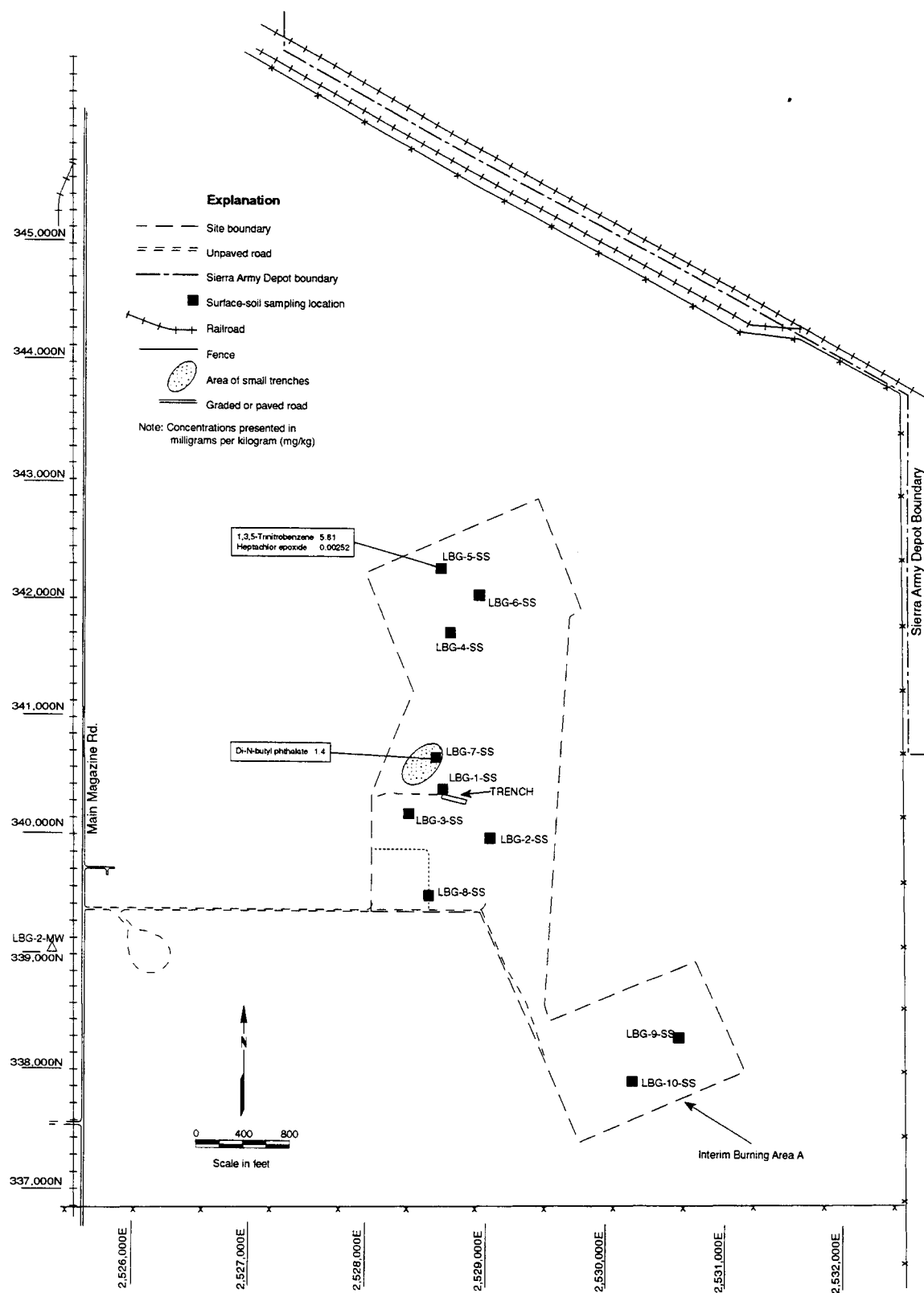


Figure 9.2

Inorganic Analytes Detected in Surface-Soil Samples that are Greater than Soil Type-specific and Regional Background Concentrations – Lower Burning Ground



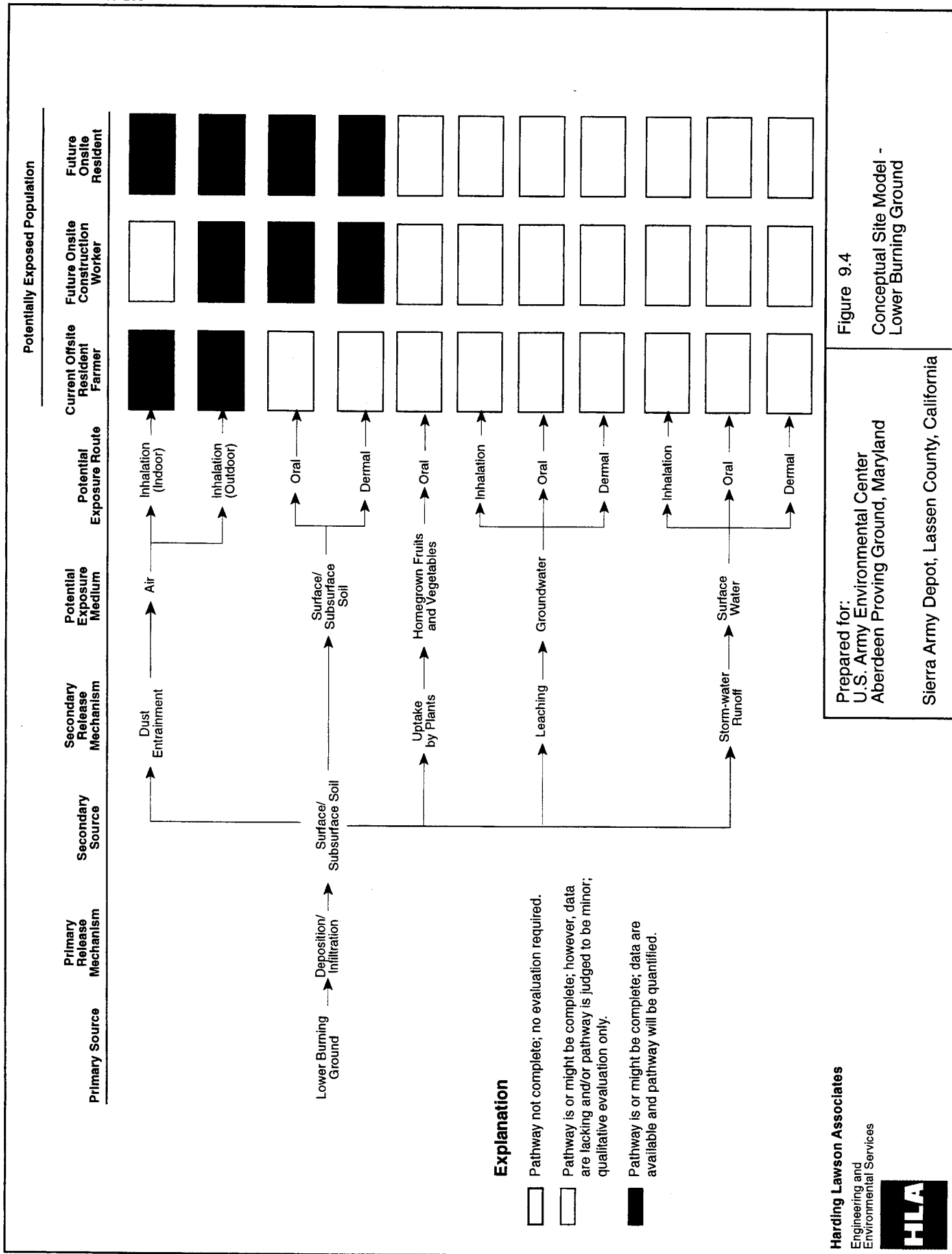
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Engineering and
Environmental Services



Prepared for:
U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland
Sierra Army Depot, Lassen County, California

Figure 9.3

Organic Analytes Detected in
Surface-Soil Samples -
Lower Burning Ground



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Environmental Services



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U.S. Army Environmental Center
Aberdeen Proving Ground, Maryland

Sierra Army Depot, Lassen County, California

Figure 9.4
Conceptual Site Model -
Lower Burning Ground

10.0 1960 DEMOLITION AREA

10.1 Declaration

This section provides the declaration portion of the ROD/RAP for the 1960 Demolition Area.

10.1.1 Location

The 1960 Demolition Area is located in the west-central portion of the Main Depot, as shown in Figure 1.1. The site was developed during 1960 when the Upper Burning Ground demolition area was closed for construction activities. The site consists of a large rectangular area measuring approximately 3,000 feet by 2,000 feet. Within the rectangular area are 24 relatively large, elongated surface depressions arranged in two rows, as shown in Figure 10.1.

10.1.2 Assessment of the Site

A contamination assessment of the 1960 Demolition Area was conducted during the Group III RI. The results of that assessment, presented in the Group III B Sites Final RI report (HLA, 1994b), are summarized as follows:

- Cobalt, copper, iron, nickel, and potassium were detected sporadically in surface soil at concentrations above background concentrations. The concentrations of these inorganic analytes probably represent natural conditions at this site.
- Cyclonite/hexahydro-1,3,5-trinitro-1,3,4-triazine (RDX) was the only explosive detected in surface soil. Its presence is likely the result of site activities.
- Three SVOCs (di-N-butyl phthalate, pyrene, and tetracosane) were detected in surface soil at concentrations just above their respective CRLs. Tetracosane was identified at very low concentrations but has no CRL. These compounds are not specifically known to have been used at the site; however, the presence of these compounds may be the result of site activities.
- Subsurface-soil sample metal concentrations detected above background levels include aluminum, cobalt, copper, manganese, nickel, and potassium.
- Groundwater samples collected from wells downgradient of the site did not indicate that groundwater quality has been impacted. Detections of antimony, lead, and nickel were below corresponding federal and/or state MCLs.

No potentially unacceptable risk to human health was identified. For current human receptors, noncarcinogenic health effects and cancer risks were below levels of regulatory concern. Ecological receptor risks include the potential for aluminum toxicity to the burrowing owl, sage grouse, and Townsend's ground squirrel as a result of soil ingestion.

Although the results of the RI indicate that no bombs remain onsite, the Army and Cal-EPA have agreed that site access shall be restricted because of the potential presence of UXO. Although these restrictions are not part of the CERCLA process, the restrictions will provide protection to human health from contaminants by limiting onsite access. On this basis, no action is recommended to achieve protection of human health and the environment.

10.1.3 Description of the Selected Remedy

As discussed in the preceding section, no action is recommended for this site. Because of the slight potential for UXO to be present at this site, deed and access restrictions will be placed on the site.

10.1.4 Statutory Determinations

No action is necessary to achieve protection of human health and the environment. None of the CERCLA § 121 statutory cleanup standards are triggered, and these requirements need not be addressed further in this ROD/RAP.

10.2 Decision Summary

This section provides the site-specific factors and analyses that were considered in the selection of No Action for the 1960 Demolition Area.

10.2.1 Site Description

The site consists of a large rectangular area measuring approximately 3,000 feet by 2,000 feet. Within the rectangular area are 24 relatively large, elongated surface depressions arranged in two rows, as shown in Figure 10.1. The largest depressions are located in the southern half of the site and are approximately 600 feet long, 100 feet wide, and 20 to 30 feet deep. The depressions have very steep-sided berms devoid of vegetation that are deeply incised by erosional gullies. The surface of the site consists of an abundance of scattered metal debris, especially in the southern half of the site. The debris includes jagged pieces of steel bomb fragments ranging in size from 1 inch to 1 foot or more in diameter. During the time that field activities were conducted at the site in June and July 1992, shallow standing water (groundwater) was present in several of the depressions.

10.2.2 Site History and Enforcement Activities

The site was developed during 1960 when the Upper Burning Ground demolition area was closed for construction activities. During 1960 and 1961, thirty-six 500-pound bombs were detonated at a rate of 12 times per day (432 bombs per day). Some of the metal fragments from this activity remain on the site surface today. CS tear gas grenades were also detonated at a rate of 200 to 248 pounds per day for a three-month period in 1961. During the 1970s, NIKE Hercules XM-30 motors were fired in silos on the site. The solid-based propellant used in the motors was burned in the silos during the firings. The NIKE motors were sent after the firings to the DPDO for salvage (ESE, 1983). The site is no longer in use for detonation of ordnance.

An Army explosive ordnance disposal (EOD) training area is located in the southern portion of the site. This area, which is south of the main bomb craters, contains concrete-lined silos placed at ground surface, scattered wooden crates, and bomb casings. The 1960 Demolition Area is currently used approximately five or six times a year as a training site for the Army EOD unit. The remainder of the time the site is unused.

Investigations that have been conducted at the 1960 Demolition Area include the Group III A Sites RI (HLA, 1994a).

The purpose of the Group III RI conducted by HLA was to ensure that potential environmental impacts associated with past activities at the site were thoroughly investigated and, if necessary, remediated. The investigation included the following:

- UXO clearance survey
- Surface geophysical survey
- Surface-soil sampling
- Subsurface-soil sampling
- Groundwater sampling

On the basis of the results of the RI contamination and risk assessments, an FS was not required for this site.

No enforcement activity has been associated with the 1960 Demolition Area. The site is subject to the requirements and schedule outlined in the FFA.

10.2.3 Highlights of Community Participation

One 30-day public comment period was held from February 7, 1996, to March 7, 1996. A public meeting was held at SIAD on February 22, 1996. Representatives of the Army, DTSC, and the Lahontan RWQCB were present at the meeting. Responses to site-specific questions raised by the public at this meeting are presented in Section 10.3 of this ROD/RAP.

The public participation requirements of CERCLA § 113(k)(2)(B)(i-v) and § 117 and § 25356.1 of the California Health and Safety Code were met in the remedy selection for this site. The response action presented for this site in this ROD/RAP was selected in accordance with CERCLA, NCP, Chapter 6.8 of the California Health and Safety Code, and the California Water Code. The basis for this decision is documented in the Administrative Record.

10.2.4 Scope and Role of Response Action

This site poses no potential threat to human health and the environment. The selected remedy is No Action. However, because of the potential for UXO to exist at the site, the Army and Cal-EPA have agreed to restrict site access by completing a perimeter fence at the site. This will be the final response action for the 1960 Demolition Area.

10.2.5 Site Characteristics

Investigation of the 1960 Demolition Area was initiated because of past uses of the site to destroy live ordnance. Potential contamination at the 1960 Demolition Area was evaluated to assess the impact of the site activities on soil and groundwater. An assessment of potential contamination at the site was based on surface geophysics, surface-soil, subsurface-soil, and groundwater analytical data.

10.2.5.1 1994 Group III RI

Geophysics

The assessment of data from the geophysical survey indicates that there were no anomalies indicating subsurface disposal at the 1960 Demolition Area. Metal debris appears to be present only on the ground surface or in the near surface. UXO surveys performed concurrently with the geophysics

survey confirmed the absence of UXO. Generally, surficial metal debris, such as ejected bomb fragments, is more abundant in the southern half of the site.

Surface Soil

Potential surface-soil contamination at the 1960 Demolition Area was assessed on the basis of 16 composite and 4 discrete surface-soil samples (Figure 10.1). The surface-soil samples were collected from a depth interval between the surface and 0.5 foot bgs. Twelve of the 16 composite surface-soil samples were collected within the surface depressions (bomb craters) created by detonating bombs. The other four composite surface-soil samples were obtained along the perimeter of the bomb craters. The four discrete surface-soil samples were collected from soil boring locations within the bomb craters. The soil samples were analyzed for TAL metals, explosives, and TCL SVOCs (including orthochlorobenzaldehyde, a breakdown product of CS tear gas).

Table 10.1 summarizes the analytical results for TAL inorganic compounds detected in the surface-soil samples at concentrations greater than background concentrations for the soil types 325 (Epot very fine sandy loam) and 330 (Calneva silt loam). Thirteen analytes were sporadically detected at concentrations above the maximum background concentration. As shown in Table 10.2, with the exception of cobalt, copper, iron, nickel, and potassium, the maximum inorganic analytes detected at concentrations higher than the soil type-specific background concentrations fall below either western regional or SIAD facilitywide background concentrations. Cobalt was detected in 2 of 25 samples at levels exceeding background (16.4 and 18.7 mg/kg at DMA-3-SB and DMA-4-SB, respectively, versus the facilitywide maximum concentration of 15.5 mg/kg). Cobalt, however, has been detected in stream sediments in the Skeddadle Mountains Wilderness Area at concentrations as high as 30 mg/kg (Table 10.1). Maximum concentrations of copper were detected at the same surface-soil locations (DMA-3-SB and DMA-4-SB) at levels of 54.3 and 61.3 mg/kg, respectively, compared to the facilitywide maximum concentration of 58.6 mg/kg. Copper was detected in stream sediments in the Skeddadle Mountains Wilderness Area at concentrations as high as 300 mg/kg (Adrian, 1987; Table 10.1).

Maximum iron concentrations of 37,700 and 45,400 mg/kg are also associated with locations DMA-3-SB and DMA-4-SB. The facilitywide maximum background concentration for iron is 29,200 mg/kg. Iron has been detected at a maximum concentration of 100,000 mg/kg in the Skedaddle Mountains (Adrian, 1987; Table 10.1). The single detection of nickel exceeding background is at DMA-4-SB at a concentration of 25.7 mg/kg. This compares to the maximum facilitywide nickel concentration of 22.4 mg/kg and the range of 5 to 50 mg/kg detected in the Skedaddle Mountains (Adrian, 1987; Table 10.1). Potassium, an essential nutrient, also was detected at maximum concentrations of 9,940 and 11,300 mg/kg at DMA-3-SB and DMA-4-SB, respectively. The maximum facilitywide background concentration of potassium is 9,100 mg/kg.

Locations DMA-1-SB, DMA-2-SB, DMA-3-SB, and DMA-4-SB are at the bottom of the bomb craters and are subject to evaporation of groundwater. Because the groundwater level is near the surface soil at these locations, the concentration of these inorganic analytes may have been influenced by a process of upward capillary action and evaporation of groundwater (Brady, 1974). All other surface-soil locations are above the bomb crater depressions and contained inorganic compounds at levels within either the soil type- specific, facilitywide, or western regional background concentrations. For this reason, it is believed that the inorganic analytes represent natural conditions at this site.

Cyclonite/hexahydro-1,3,5-trinitro-1,3,4-triazine (RDX) was the only explosive detected in surface-soil samples. This analyte was detected in DMA-15-SS-D (the duplicate sample for DMA-15-SS) at a concentration of 1.64 mg/kg. The CRL for RDX was 0.587 mg/kg. Thus, the low concentration of RDX detected in DMA-15-SS-D was only slightly greater than the CRL. RDX was not detected above the CRL in the investigative sample DMA-15-SS. Therefore, the concentration of this compound was not reproducible. This is likely attributable to the physical limitations of collecting duplicate soil, which is a heterogeneous medium. Although RDX was not detected in the investigative soil sample DMA-15-SS and because the duplicate sample contained this compound above the CRL, RDX is considered to likely be present (in low concentrations near the CRL values) at the site. Explosives are known to have been detonated at this site, and therefore, the presence of this compound is likely a result of site activities.

Three semivolatiles (di-N-butyl phthalate, pyrene, and tetracosane) were detected in the 1960 Demolition Area surface-soil samples. Di-N-butyl phthalate was detected in DMA-6-SS and DMA-10-SS at concentrations of 1.3 and 2.7 mg/kg, respectively. The CRL for di-N-butyl phthalate was 1.3 mg/kg. Pyrene was detected in DMA-15-SS and its duplicate sample DMA-15-SS-D at low concentrations of 0.099 and 0.11 mg/kg, respectively. The CRL for pyrene was 0.033 mg/kg. Because the concentrations of pyrene in DMA-15-SS and DMA-15-SS-D are very similar, the value of pyrene detected in DMA-15-SS is considered to be reproducible. Tetracosane was detected as a TIC in DMA-14-SS and DMA-16-SS at concentrations of 0.36 and 0.46 mg/kg, respectively. Because tetracosane is a TIC, its identity was not confirmed, and there is no corresponding CRL for this analyte. Di-N-butyl phthalate and pyrene were considered to likely be present (in low concentrations near the CRL values) where they were detected within the site. These compounds are not specifically known to have been used or released at this site; however, the presence of these compounds may still be a result of site activities.

Subsurface Soil

Subsurface-soil contamination at the 1960 Demolition Area was assessed on the basis of 10 subsurface-soil samples collected from four soil borings (DMA-1-SB through DMA-4-SB) identified in Figure 10.1. The samples were analyzed for TAL metals and explosives. Explosives were not detected in the samples analyzed.

Table 10.2 summarizes the analytical results for TAL metals detected in subsurface-soil samples at concentrations exceeding background concentrations for subsurface soil. Each investigative sample was compared to the corresponding background concentration based on the soil type of the investigative sample. As indicated in Table 10.3, the concentration of several analytes (aluminum, cobalt, copper, manganese, nickel, and potassium) in the subsurface soil exceeded background levels.

Groundwater

Potential contamination of groundwater at the 1960 Demolition Area was assessed on the basis of two groundwater samples (DMA-1-HP and DMA-2-HP) collected from accumulated water in two shallow borings approximately 150 feet west (downgradient) of the 1960 Demolition Area site boundary. The groundwater samples were analyzed for TAL metals, hexavalent chromium, and macroparameters.

Sulfates were detected in the groundwater samples collected from DMA-1-HP and DMA-2-HP at concentrations of 2,700,000 to 8,300,000 $\mu\text{g/l}$, respectively. Sulfates were only analyzed in one background groundwater sample, BKG-3-HP, which had a detected sulfate concentration of 14,000,000 $\mu\text{g/l}$. Therefore, the concentrations of sulfates detected in the groundwater samples from DMA-1-HP and DMA-2-HP are considered to be within the natural range of sulfate concentrations in groundwater expected for this area. Although the CRLs for antimony, lead, and nickel exceeded the calculated background concentration, the detections were below the corresponding MCL (federal and/or state) or proposed MCL, as shown in Table 10.4.

10.2.6 Summary of Site Risks

This section presents a review of the baseline risk assessment conducted for the 1960 Demolition Area during the Group III B Sites RI. Soil, including both surface and subsurface soil, is the only medium of concern at the site based on the results of the EHHE (HLA, 1994b).

10.2.6.1 Chemicals of Potential Concern

The COPCs identified in the EHHE for the site surface and subsurface soil were the following:

- Arsenic
- Beryllium
- Chromium (total)
- Manganese
- Nickel
- Thallium

10.2.6.2 Contaminant Fate and Transport

Metals are not prone to volatilization; however, they may become entrained in air with dusts. Because all six metal COPCs are found in surface soil, inhalation of entrained dusts by both current and future receptors may be important. The metal COPCs in surface soil will not tend to be mobilized by surface runoff in significant concentrations. Additionally, the geographic relief of the 1960 Demolition Area does not provide for surface runoff from this site.

10.2.6.3 Exposure Routes and Receptors

Many receptor populations and exposure pathways were evaluated for the site in the EHHE (HLA, 1994b), as shown in Figure 10.2. Hypothetical receptors were identified on the basis of the chemicals detected at the site, current and future land uses, demographics of the area, and actual or possible activities of the population in question. Possible receptors considered in the analysis include current and future child and adult residents (both onsite and offsite), military and civilian workers, construction workers, and casual civilian visitors. Receptor populations selected for evaluation were considered to be hypothetical receptors whose inclusion in the risk analysis would provide estimates of potential upper-bound human health risks associated with exposure to the COPCs.

The following factors were considered in assessing whether current receptor populations would be evaluated for this site:

- The site is currently inactive (i.e., it has no current military uses), with no regular or intermittent visits onsite by military workers (Weis, oral commun., 1992).
- Military EOD personnel visit an area immediately south of the site boundary approximately eight times per year, for one working day per visit, to demonstrate equipment in a SIAD training program (Weis, pers. commun., 1993).
- There are no residences onsite.
- Honey Lake, located west of the site, historically occupies approximately 60,000 acres; however, only approximately 2,000 acres are currently covered by water. The nearest towns of Sage Flats and Herlong are located five to six miles southeast of the site.
- The site is within the fenced Depot boundary; access is controlled by routine base security measures, and the site is off limits to casual civilian visitors.

Based on these factors, offsite military workers were evaluated as a current receptor population. The following receptor populations are not present at the site and were, therefore, not evaluated in the HHE: current onsite workers, current child and adults residents (both onsite and offsite), current onsite construction workers, and current casual civilian visitors.

Possible future receptor populations at the 1960 Demolition Area were also considered, although residential development is very unlikely. Hypothetical future construction workers and hypothetical future onsite residents (both children and adults) were evaluated as receptor populations at this site.

Cal-EPA (1992) requested that a health risk assessment of hypothetical onsite resident scenarios be included in the HHE so that future determinations can be made regarding deed restrictions.

Therefore, the following receptor populations were evaluated for this site:

- Current offsite military workers
- Future onsite construction workers
- Future onsite residents (children and adults)

The future receptors are considered to be hypothetical individuals, assumed to be exposed to the COPCs via the conservative exposure assumptions used in this HHE. It is likely that receptors and actual exposure at the site in the future will be less than what is presented here. The following receptor populations and exposure pathways were quantified in the EHHE.

Current Scenario

- Offsite military worker
 - Inhalation of dust from outdoor air

Future Scenario

- Onsite Construction Worker
 - Inhalation of dust from outdoor air
 - Ingestion of soil
 - Dermal contact with soil
- Onsite Resident
 - Inhalation of dust from outdoor air
 - Inhalation of dust from indoor air
 - Ingestion of soil
 - Dermal contact with soil

The results of the quantification of exposure pathways presented in the EHHE indicated the following:

- Noncarcinogenic health effects are not of concern for the current and future receptors evaluated. (An HI of less than 1.0 was estimated.) HIs greater than one were estimated for future receptors due primarily to ingestion of thallium in soil.
- Carcinogenic risk estimates for the current offsite receptor were 4×10^{-6} for the average scenario and 2×10^{-5} for the RME scenario. Carcinogenic risk estimates for future individual receptors ranged from 2×10^{-6} to 5×10^{-5} for the average scenario and from 3×10^{-6} to 2×10^{-4} for the RME scenario. Risks above EPA's acceptable range of 1×10^{-4} to 1×10^{-7} were due primarily to inhalation of chromium and arsenic.

Figure 10.1 summarizes the exposure pathways and receptor populations for this site. Hypothetical average and RME exposures to these receptors via these exposure pathways were quantitatively estimated.

The pathways identified in the EHHE can be eliminated on the basis of the following considerations: (1) present land use and projected future land use, (2) low levels of risk as presented in Table 10.5, and (3) the physical hazard from the potential for the presence of UXO.

Present and projected future land use is a fundamental component when evaluating the relevance of potential exposure pathways. Land use assumptions provide the basis for identifying potential exposure pathways and developing the corresponding contaminant levels that are protective of human health and the environment. Future residential land use at SIAD is extremely unlikely. (Based on local city and county planning documents, including the Master Environmental Assessment for Lassen Southeast Planning Area [Lassen County Planning Department, June 1990]; the Wendel Area Plan and Environmental Impact Report [Resource Concepts, 1987]). Although SIAD has been targeted for realignment by the BRAC, transfer of this land to the public for residential use remains infeasible due to the potentially buried UXO and deed restrictions to be attached to this site.

10.2.6.4 Human Health Risks

The results of the human health risk estimation for both current and future receptors are summarized in Table 10.5. Possible noncancer health effects were evaluated separately. For current receptors, all possible adverse noncancer health effects were below levels of regulatory concern, and estimated cancer risks ranged from 4×10^{-6} to 2×10^{-5} . For hypothetical future receptors, the maximum estimated HI of 5 indicated that possible noncancer health effects (primarily associated with thallium ingestion) may be of concern at this site in the future. The cancer risk estimates ranged from

2×10^{-6} to 2×10^{-4} . The high end of this range is primarily associated with dust inhalation and ingestion of soil by hypothetical future composite child/adult resident receptors. The estimated risks were due primarily to chromium and arsenic. These estimates could indicate that possible cancer risk would be within the range of regulatory concern. However, the high end of this range (2×10^{-4}) is a risk estimate based on RME exposure. The chromium detected at this and other sites at SIAD was not speciated by the laboratory, being reported as "total chromium." For the purposes of this risk assessment, chromium was conservatively assumed to occur in the hexavalent form. However, chromium VI is not typically expected to persist in the environment because it tends to combine with organic compounds to form chromium III compounds, which are not carcinogenic. Moreover, chromium VI was not expected to be generated by the activities historically or currently conducted at SIAD. For these reasons, cancer risk estimates associated with dust inhalation, which were driven by chromium VI, are likely to be overestimated. Additionally, arsenic at this site is considered a natural condition.

10.2.6.5 Environmental Risks

A qualitative EE was performed for SIAD. The purpose of the EE was to evaluate the potential for adverse effects to ecological receptors as a result of possible exposure to chemicals originating from chemical source areas. Both direct and indirect routes of exposure were considered for five terrestrial indicator species at the 1960 Demolition Area. The one aquatic indicator species (mallard duck) was not evaluated at this site because aquatic receptors are not known to inhabit the site or nearby areas. The complete exposure pathways identified for the 1960 Demolition Area are discussed below and summarized in Table 10.6.

Plants may take up COPCs in surface and subsurface soil via their root systems if the roots are in direct contact with the chemicals and the chemicals are available for uptake. Plants may also take up soluble COPCs through the stomata or leaf cuticle after foliar deposition (Fergusson, 1990).

The most significant direct exposure pathway for herbivorous terrestrial animals (e.g., sage grouse and Townsend's ground squirrel) to chemicals in soil is through ingestion. The indirect exposure pathway of ingestion of soil while preening or grooming is expected to represent the main exposure

route from dermally contacted chemicals. In addition, herbivorous terrestrial animals may possibly ingest seeds and other plant parts containing COPCs.

The two predatory indicator species, the burrowing owl and the kit fox, may also be directly exposed to chemicals in soil via ingestion. The burrowing owl may be exposed via soil ingestion while feeding or preparing and maintaining its nest. The kit fox may also be exposed while preparing and maintaining its den, as well as while foraging for the grubs and plants that comprise a small part of its diet. All indirect soil pathways (e.g., ingestion of plants) are considered to be complete for these two indicator species, except for ingestion of plants by the burrowing owl, which is strictly a carnivore.

The potential for aluminum and toxicity was indicated for the Townsend's ground squirrel, sage grouse, and the burrowing owl as a result of incidental soil ingestion at the 1960 Demolition Area. It is not known whether the sage grouse, Townsend's ground squirrel, or the burrowing owl actually inhabit the 138-acre 1960 Demolition Area, but because of the large acreage associated with the site, this possibility was not ruled out.

10.2.7 Description of the No Action Alternative

Based on the results of the baseline risk assessment performed during the RI for the 1960 Demolition Area, there is no adverse impact to human health or the environment from site-related activities. Thus, the No Action alternative is supported by the baseline risk assessment discussed in Section 10.2.6 and the Administrative Record. The 1960 Demolition Area is an isolated site in an inner secured area of SIAD. The placement of deed and/or access restrictions on the site due to the potential presence of UXO will ensure that there is no future use that will be harmful to human health.

10.2.8 Explanation of Significant Changes

The Proposed Plan for the nine sites was released to the public for comment on February 1, 1996. The preferred alternative identified for the 1960 Demolition Area was No Action. Based on the absence of any new information or comments during the public comment period, no significant

changes to the selected remedy for the 1960 Demolition Area outlined in the Proposed Plan for Nine Sites were necessary.

10.3 Responsiveness Summary

The public comment period for the Proposed Plan for Nine Sites at SIAD began on February 7, 1996, and extended through March 7, 1996. No written comments were received by the Army or regulatory agencies. The public meeting presenting the Proposed Plan was held on February 22, 1996. No oral comments were received for the 1960 Demolition Area at the public meeting.

Table 10.1: Summary of Analyte Concentrations in Surface-Soil Samples That are Greater Than Background Concentrations - 1960 Demolition Area*

| Depth (feet): Sample Date: Soil Type: | Minimum ^b Background Concentration | Maximum ^b Background Concentration | DMA-1-SB | | DMA-1-SS | | DMA-2-SB | | DMA-2-SS | | DMA-2-SS-D | | DMA-3-SB | | DMA-3-SB-D | | DMA-3-SS | | DMA-4-SB | | DMA-4-SB-D | | DMA-4-SS | |
|---|---|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----|
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Not applicable 325 and 330 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | Not applicable 325 | |
| Inorganic Analytes | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | 12,100 | 29,200 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 33,600 | 31,000 | --- | --- | --- | --- | 53,200 | --- | --- | --- | --- |
| Arsenic | 0.500 | 4.63 | --- | --- | --- | --- | --- | 6.7 | --- | --- | --- | --- | 14.9 | NA | --- | --- | --- | --- | 4.9 | --- | --- | --- | --- | |
| Chromium | 9.44 | 23.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 23.2 | --- | --- | --- | --- | --- | 28.8 | --- | --- | --- | --- | |
| Cobalt | 5.80 | 15.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 16.4 | --- | --- | --- | --- | --- | 18.7 | --- | --- | --- | --- | |
| Copper | 16.2 | 58.6 | --- | --- | --- | --- | --- | 41.6 | --- | --- | --- | --- | 54.3 | 48 | --- | --- | --- | --- | 61.3 | --- | --- | --- | --- | |
| Iron | 12,600 | 29,200 | --- | --- | --- | --- | 30,000 | --- | --- | --- | --- | --- | 37,700 | 34,500 | --- | --- | --- | --- | 45,400 | --- | --- | --- | --- | |
| Magnesium | 7,780 | 15,000 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 17,800 | 16,200 | --- | --- | --- | --- | 19,400 | --- | --- | --- | --- | |
| Manganese | 453 | 781 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 786 | --- | --- | --- | --- | |
| Nickel | 8.20 | 21.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 25.7 | --- | --- | --- | --- | |
| Potassium | 3,850 | 9,100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 9,940 | --- | --- | --- | --- | --- | 11,300 | --- | --- | --- | --- | |
| Sodium | 721 | 6,240 | --- | --- | --- | --- | 8,730 | --- | --- | --- | --- | --- | 8,710 | 8,800 | --- | --- | --- | --- | 8,140 | --- | --- | --- | 8,140 | |
| Vanadium | 30.1 | 63.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 87.7 | 73.5 | --- | --- | --- | --- | 101 | --- | --- | --- | --- | |
| Zinc | 26.8 | 73.3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 80 | --- | --- | --- | --- | |

Table 10.1: Summary of Analyte Concentrations in Surface-Soil Samples That are Greater Than Background Concentrations - 1960 Demolition Area*
(continued)

| | DMA-5-SS | | DMA-6-SS | | DMA-7-SS | | DMA-7-SS-D | | DMA-8-SS | | DMA-9-SS | | DMA-10-SS | | DMA-11-SS | |
|----------------------------|----------|----------|----------|----------|----------|----------|------------|----------|----------|----------|----------|----------|-----------|----------|-----------|----------|
| Depth (feet): | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Sample Date: | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 | 08/18/92 |
| Soil Type: | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 | 325 |
| Inorganic Analytes: | | | | | | | | | | | | | | | | |
| Aluminum | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Arsenic | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cobalt | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Copper | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Iron | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Magnesium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Manganese | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Nickel | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Potassium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sodium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vanadium | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Zinc | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 10.1: Summary of Analyte Concentrations in Surface-Soil Samples That are Greater Than Background Concentrations - 1960 Demolition Area^a
(continued)

| | DMA-12-SS | DMA-13-SS | DMA-14-SS | DMA-15-SS | DMA-15-D | DMA-16-SS |
|--|-----------|-----------|-----------|-----------|----------|-----------|
| Depth (feet): | 0 | 0 | 0 | 0 | 0 | 0 |
| Sample Date: | 08/17/92 | 03/17/93 | 03/03/93 | 03/03/93 | 03/03/93 | 03/17/93 |
| Soil Type: | 325 | 325 | 325 | 325 | 325 | 325 |
| Inorganic Analytes | | | | | | |
| Aluminum | --- | --- | --- | --- | --- | --- |
| Arsenic | --- | 6.4 | 5.7 | --- | 5.5 | 6.3 |
| Chromium | --- | --- | --- | --- | --- | --- |
| Cobalt | --- | --- | --- | --- | --- | --- |
| Copper | --- | --- | --- | --- | --- | --- |
| Iron | --- | --- | --- | --- | --- | --- |
| Magnesium | --- | --- | --- | --- | --- | --- |
| Manganese | --- | --- | --- | --- | --- | --- |
| Nickel | --- | --- | --- | --- | --- | --- |
| Potassium | --- | --- | --- | --- | --- | --- |
| Sodium | --- | 7,010 | 8,200 | --- | --- | 7,010 |
| Vanadium | --- | --- | 76 | --- | --- | --- |
| Zinc | --- | --- | --- | --- | --- | --- |
| <div> <div><</div> <div>Less than certified reporting limits</div> </div> <div> <div>---</div> <div>Analyte not detected at levels exceeding background</div> </div> <div> <div>NA</div> <div>Not analyzed</div> </div> | | | | | | |

- a. Values are reported in milligrams per kilogram.
b. Minimum and maximum concentrations for background surface-soil types 325 and 330 taken from Table 5.4 of the Group III B Sites Final RI report (HLA, 1994b).

Table 10.2: Comparison of Maximum Analyte Detections in Surface Soil at the 1960 Demolition Area to Average Elemental Concentrations in Soil of the Western United States and Observed Concentrations at SIAD^a

| Analyte | Maximum Surface Soil Detection at the 1960 Demolition Area ^b | Mean ^{a,c} | Range of Detected Background Concentrations at SIAD ^d |
|------------|--|---------------------|---|
| Aluminum | 53,200 | 74,000 | 1,780 to 29,200 |
| Antimony | --- | 0.62 | 0.270 to 7.14 |
| Arsenic | 14.9 | 7.0 | 0.500 to 18.0 |
| Barium | --- | 670 | 41.4 to 630 |
| Beryllium | --- | 0.97 | 0.492 to 1.86 |
| Cadmium | --- | NA | 0.589 to 3.05 |
| Calcium | --- | 33,000 | 1,180 to 69,000 |
| Chromium | 28.8 | 56 | 4.05 to 31.0 |
| Cobalt | 18.7 | 9.0 | 1.38 to 15.0 |
| Copper | 61.3 | 27 | 3.70 to 58.6 |
| Iron | 45,400 | 26,000 | 3,330 to 29,200 |
| Lead | --- | 20 | 0.170 to 10.5 |
| Magnesium | 19,400 | NA | 1,400 to 26,600 |
| Manganese | 786 | 480 | 57.7 to 781 |
| Mercury | --- | 0.065 | 0.0500 |
| Molybdenum | --- | 1.1 | 1.12 to 52.8 |
| Nickel | 2.57 | 19 | 0.240 to 22.4 |
| Potassium | 11,300 | NA | 1,230 to 9,100 |
| Selenium | --- | 0.34 | 0.250 |
| Silver | --- | NA | 0.250 to 2.50 |
| Sodium | 8,800 | 12,000 | 352 to 18,500 |
| Thallium | --- | NA | 6.38 to 62.9 |
| Vanadium | 101 | 88 | 9.76 to 130 |
| Zinc | 80 | 65 | 8.03 to 84.2 |

All measurements are in milligrams per kilogram (mg/kg).

--- Analyte not detected at levels exceeding soil type-specific background.

- a. Shacklette, H. T., and Boerngen, J.G., 1984, Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, U.S. Geological Survey Professional Paper 1270, 105 pp.
- b. Taken from Table 5-17 of the Group III B Sites Final RI report (HLA, 1994b).
- c. Mean is the estimated arithmetic mean for soil of the western United States.
- d. Taken from Table 5.14 of the Group III B Sites Final RI report (HLA, 1994b).

Table 10.3: Summary of Analyte Concentrations In Subsurface-Soil Samples That are Greater Than Background Concentrations - 1960 Demolition Area*

| Maximum Background Concentration | | | | | | | | | |
|----------------------------------|-------------------|----------------------------|----------------|--|----------|------------|----------|--|--|
| Depth (feet): | Not applicable | Not applicable | Not applicable | Not applicable | DMA-1-SB | DMA-1-SB | DMA-2-SB | | |
| Sample Date: | Not applicable | Not applicable | Not applicable | Silty/clayey sand or sand and silt/clay ^d | 08/17/92 | 08/17/92 | 08/18/92 | | |
| Soil Type: | Sand ^b | Silt and clay ^c | | | Clay | Silty sand | Clay | | |
| Inorganic Analytes | | | | | | | | | |
| Aluminum | 9,910 | 28,000 | 28,000 | | 31,900 | 22,800 | 31,400 | | |
| Chromium | 12.7 | 31.0 | 31.0 | | --- | --- | --- | | |
| Cobalt | 15.0 | 15.0 | 15.0 | | 15.8 | --- | 15.5 | | |
| Copper | 58.6 | 58.6 | 58.6 | | --- | --- | --- | | |
| Lead | 6.62 | 6.62 | 6.62 | | 6.9 | --- | --- | | |
| Manganese | 311 | 707 | 707 | | --- | --- | 748 | | |
| Nickel | 12.6 | 22.4 | 22.4 | | --- | --- | --- | | |
| Potassium | 4,930 | 8,200 | 8,200 | | 8,720 | 5,650 | 10,000 | | |

| DMA-2-SB-D | | | | | | | | | | DMA-3-SB | | | | | | | | | | DMA-4-SB | | | | | | | | | | DMA-4-SB | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------|---|---|-----|---|-----|---|---|--|--|----------|--|--|--|--|--|--|--|--|--|----------|--|--|--|--|--|--|--|--|--|----------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Depth (feet): | 3 | 2 | 3.5 | 1 | 1.5 | 2 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 10.3: Summary of Analyte Concentrations in Subsurface-Soil Samples That are Greater Than Background Concentrations - 1960 Demolition Area^a
(continued)

| | |
|-----|--|
| < | Less than certified reporting limits |
| --- | Analyte not detected at levels exceeding background |
| NA | Not analyzed |
| a. | Values are reported in milligrams per kilogram. |
| b. | Maximum background concentrations for subsurface sandy soil taken from Table 5.8 of the Group III B Sites Final RI report (HLA, 1994b). |
| c. | Maximum background concentrations for subsurface silt and clay soil taken from Table 5.7 of the Group III B Sites Final RI report (HLA, 1994b). |
| d. | Maximum background concentrations for subsurface soil consisting of sand, silt, and clay taken from Table 5.9 of the Group III B Sites Final RI report (HLA, 1994b). |

Table 10.4: Summary of Analyte Concentrations in Groundwater That are Greater Than Background Concentrations - 1960 Demolition Area^a

| Sample Date: | Maximum Background Concentration ^b | Primary Maximum Contaminant Level | | DMA-1-HP | DMA-1-HP-D | DMA-2-HP | DMA-2-HP | DMA-2-HP-D |
|----------------------------|---|-----------------------------------|-------|----------|------------|----------|----------|------------|
| | | Federal | State | | | | | |
| | Not applicable | Not applicable | | 3/17/93 | 3/17/93 | 3/04/93 | 3/17/93 | 3/04/93 |
| Inorganic Analytes: | | | | | | | | |
| Antimony | 112 | 6 | N/L | <38.0 | NA | <38.0 | NA | <38.0 |
| Lead | 3.15 | 15 ^c | 50 | <25 | NA | - | NA | - |
| Nickel | 17.2 | 100 | N/L | <34.3 | NA | <34.3 | NA | <34.3 |

- < Less than certified reporting limit
- Analytes not detected at levels exceeding background
- N/L No maximum contaminant level for the respective analyte
- NA Not analyzed
- MCL Maximum contaminant level

a. Values reported in micrograms per liter.
b. Maximum concentrations for background groundwater samples taken from Table 5.11 of the Group III B Sites Final RI report (HLA, 1994b); background wells for 1960 Demolition Area are Wells DSB-04-MW and BKG-03-HP.
c. Action level.

**Table 10.5: Summary of Multipathway Exposures
1960 Demolition Area**

| Receptor Populations Exposure Pathways | Hazard Index | | Potential Upperbound Excess Cancer Risk | |
|--|--------------|----------|--|----------|
| | Average | RME | Average | RME |
| Current Scenario | | | | |
| Adult Workers (Offsite) | | | | |
| Inhalation of Dust from Outdoor Air | 2.25E-02 | 3.10E-02 | 4.47E-06 | 1.76E-05 |
| Multipathway Exposures | 2E-02 | 3E-02 | 4E-06 | 2E-05 |
| Future Scenario | | | | |
| Construction Workers (Onsite) | | | | |
| Ingestion of Soil | 5.48E-02 | 1.23E-01 | 3.34E-07 | 8.15E-07 |
| Dermal Contact with Soil | 2.84E-03 | 1.98E-02 | 1.72E-08 | 1.32E-07 |
| Inhalation of Dust from Outdoor Air | 5.16E-02 | 7.34E-02 | 1.51E-06 | 2.29E-06 |
| Multipathway Exposures | 1E-01 | 2E-01 | 2E-06 | 3E-06 |
| Child/Adult Residents (Onsite) | | | | |
| Ingestion of Soil | 2.00E+00 | 4.22E+00 | 1.19E-05 | 3.34E-05 |
| Dermal Contact with Soil | 1.82E-01 | 9.03E-01 | 1.15E-06 | 1.39E-05 |
| Inhalation of Dust from Outdoor Air | 5.26E-02 | 1.02E-01 | 9.44E-06 | 3.11E-05 |
| Inhalation of Dust from Indoor Air | 1.72E-01 | 2.75E-01 | 2.91E-05 | 7.89E-05 |
| Multipathway Exposures | 2E+00 | 5E+00 | 5E-05 | 2E-04 |
| Adult Residents (Onsite) | | | | |
| Ingestion of Soil | 3.71E-01 | 3.91E-01 | 2.78E-06 | 1.11E-05 |
| Dermal Contact with Soil | 4.25E-02 | 2.22E-01 | 3.18E-07 | 6.31E-06 |
| Inhalation of Dust from Outdoor Air | 2.42E-03 | 5.70E-03 | 4.81E-07 | 3.90E-06 |
| Inhalation of Dust from Indoor Air | 3.05E-02 | 4.73E-02 | 6.07E-06 | 3.23E-05 |
| Multipathway Exposures | 4E-01 | 7E-01 | 1E-05 | 5E-05 |

RME Reasonable maximum exposure

Table 10.6: Ecological Exposure Pathways Qualitatively Evaluated for the 1960 Demolition Area

| Possible Exposure Routes* | Potential Receptors# | | | | | | |
|---------------------------------------|----------------------|----------------|--------------------|-----|-----------|------|---------|
| | Terrestrial | | | | | | Aquatic |
| | Indian | Townsend's | | | Burrowing | Kit | Mallard |
| | Rice Grass | Sage Grouse | Ground Squirrel | Owl | Fox | Duck | |
| Soil | | | | | | | |
| Direct Pathways | | | | | | | |
| Uptake by plants | Y | --- | --- | --- | --- | --- | --- |
| Ingestion | --- | Y | Y | Y | Y | --- | --- |
| Indirect Pathways | | | | | | | |
| Plant ingestion | --- | Y | Y | N | Y | --- | --- |
| Ingestion during preening or grooming | --- | Y | Y | Y | Y | --- | --- |
| Ingestion of herbivores by carnivores | --- | --- | --- | Y | Y | --- | --- |

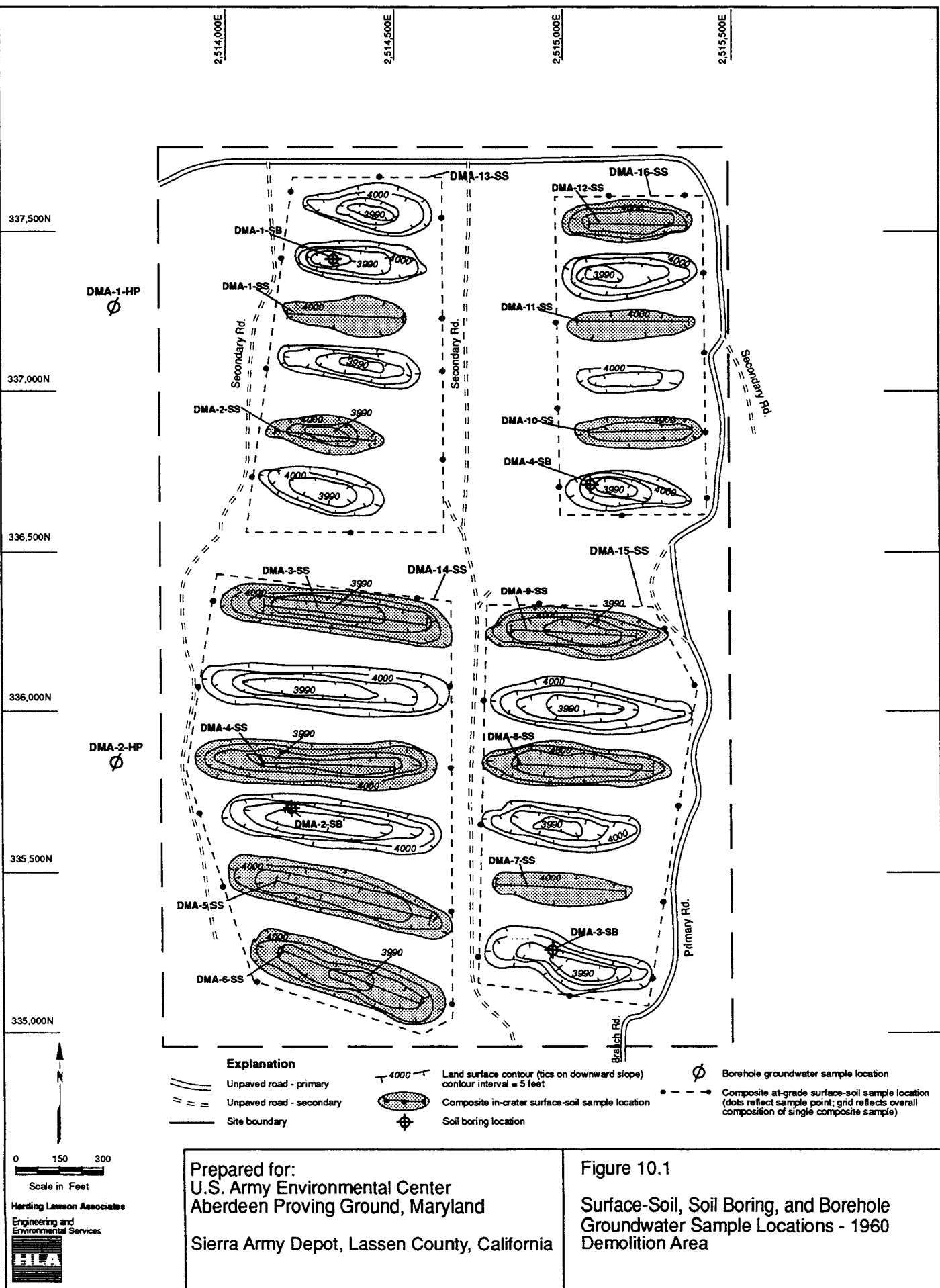
--- Not applicable

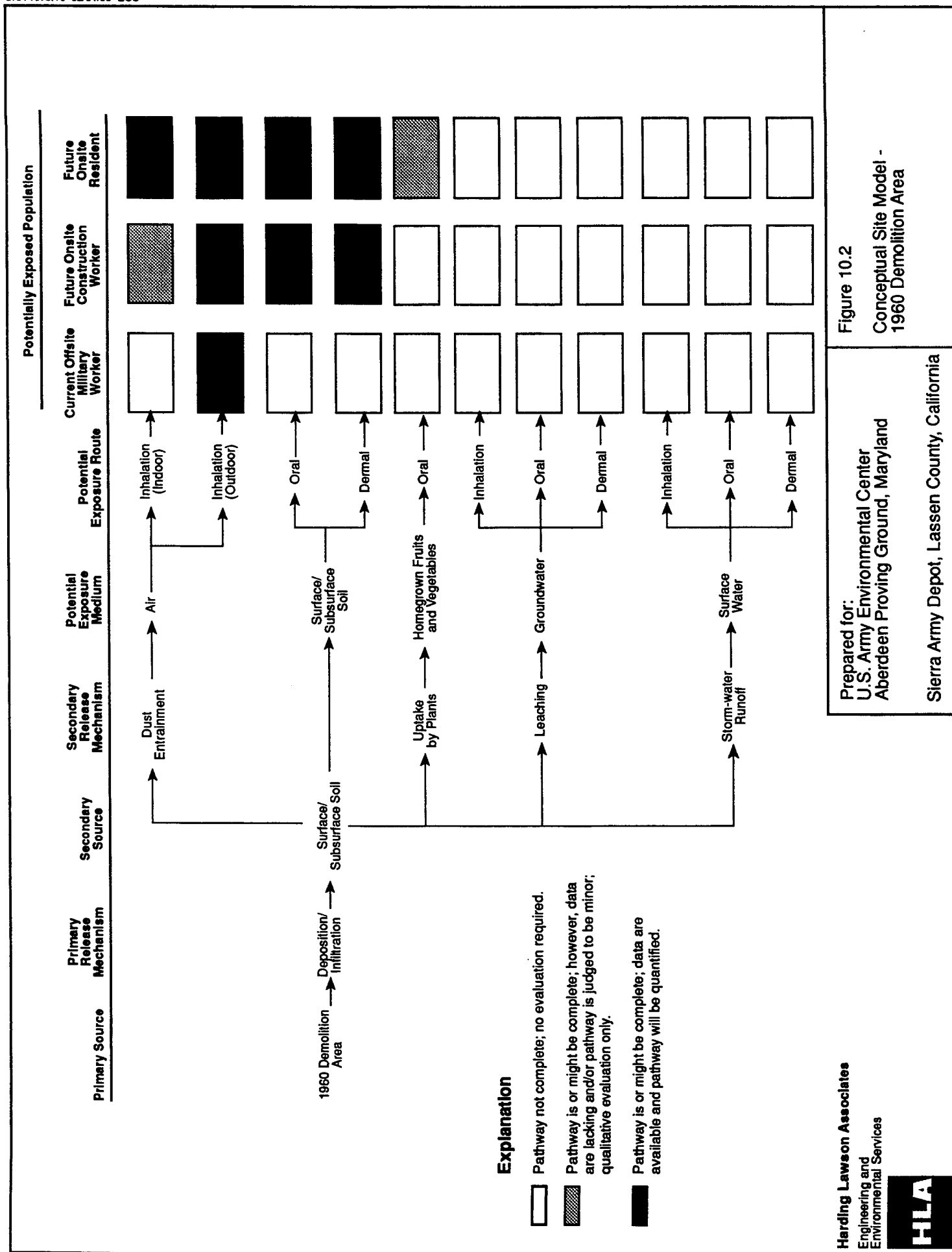
N Exposure pathway was not evaluated in the ecological assessment because pathway was considered incomplete.

Y Exposure pathway was considered complete and was evaluated in the ecological assessment.

* Potential exposure routes considered for inclusion in the ecological assessment.

Potential receptors are representative indicator species possibly exposed to COPCs.





11.0 ACRONYMS

| | |
|---------|---|
| ADRA | Ammunition Demilitarization and Renovation Area |
| ARAR | Applicable or relevant and appropriate requirement |
| Army | U.S. Department of the Army |
| BETX | Benzene, ethylene, toluene, xylenes |
| bgs | Below ground surface |
| BHC | Alpha-benzenehexachloride |
| BNA | base/neutral/acid extractable compound |
| BRAC | Base Closure and Realignment Act |
| Cal-EPA | California Environmental Protection Agency |
| CCR | Code of California Regulations |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| CERFA | Community Environmental Response Facilitation Act |
| CFR | Code of Federal Regulations |
| cm/s | Centimeters per second |
| COPC | Compound of potential concern |
| CRL | Certified reporting limit |
| cy | Cubic yards |
| DDD | 2,2-bis(p-Chlorophenyl)-1,1-dichloroethane |
| DDE | 2,2-bis(p-Chlorophenyl)-1,1,1-dichloroethene |
| DDT | 2,2-bis(p-Chlorophenyl)-1,1,1-trichloroethane |
| DPDO | Defense Property Disposal Office |
| DRMO | Defense Reutilization and Marketing Office |
| DTSC | Department of Toxic Substances Control |
| DWR | Department of Water Resources |
| EE | Environmental Evaluation |
| EHHE | Environmental and Human Health Evaluation |

Acronyms

| | |
|-----------|--|
| ELCR | Excess lifetime cancer risk |
| EOD | Explosive and ordnance demolition |
| EPA | U.S. Environmental Protection Agency |
| ESE | Environmental Science and Engineering, Inc. |
| FFA | Federal Facility Site Remediation Agreement |
| FS | Feasibility Study |
| GC/MS | Gas chromatography/mass spectrometry |
| GPR | Ground penetrating radar |
| HHE | Human health evaluation |
| HI | Hazard index |
| HLA | Harding Lawson Associates |
| HPC | Heterotrophic plate count |
| HWM | Hazardous Waste Management |
| IRP | Installation Restoration Program |
| JMM | J.M. Montgomery Consulting Engineers, Inc. |
| kg | Kilogram |
| l | Liter |
| LBG | Lower Burning Ground |
| MCL | Maximum contaminant level |
| MEK | Methyl ethyl ketone |
| mg/l | Milligrams per liter |
| mg/kg-day | Milligrams per kilogram body weight per day |
| mg/kg | Milligrams per kilogram |
| MRL | Method reporting limit |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NPL | National Priorities List |
| PCBs | Polychlorinated biphenyls |

| | |
|-------|--|
| PCE | Tetrachloroethene |
| PRG | Preliminary remediation goal |
| PSW | Potable supply well |
| QC | Quality control |
| RAOs | Remedial Action Objectives |
| RAP | Remedial Action Plan |
| RCRA | Resource Conservation and Recovery Act |
| RDX | Cyclometrimethylenetrinitroamine |
| RI | Remedial Investigation |
| RME | Reasonable maximum exposure |
| ROD | Record of Decision |
| RWQCB | Regional Water Quality Control Board |
| SARA | Superfund Amendments and Reauthorization Act of 1986 |
| SIAD | Sierra Army Depot |
| STLC | Soluble threshold limit concentration |
| SVOC | Semivolatile organic compound |
| SWRCB | State Water Resources Control Board |
| TAL | Target analyte list |
| TBC | To be considered |
| TCA | Trichloroethane |
| TCE | Trichloroethylene |
| TCL | Target compound list |
| TDS | Total dissolved solid |
| TEPS | Total Environmental Program Support |
| TIC | Tentatively identified compound |
| TNT | Trinitrotoluene |
| TOCDD | Total octachlorodibenzo-p-dioxin |

Acronyms

| | |
|----------|--|
| TPH | Total petroleum hydrocarbon |
| TRPH | Total recoverable petroleum hydrocarbons |
| TTLC | Total Threshold Limit Concentration |
| TVH | Total volatile hydrocarbon |
| USAEC | U.S. Army Environmental Center |
| USAEHA | U.S. Army Environmental Hygiene Agency |
| USATHAMA | U.S. Army Toxic and Hazardous Materials Agency |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| UXO | Unexploded ordnance |
| VOC | Volatile organic compound |
| WDR | Waste discharge requirement |
| WET | Waste extraction test |
| °F | Degrees Fahrenheit |
| μg/l | Micrograms per liter |
| μg/g | Micrograms per gram |

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